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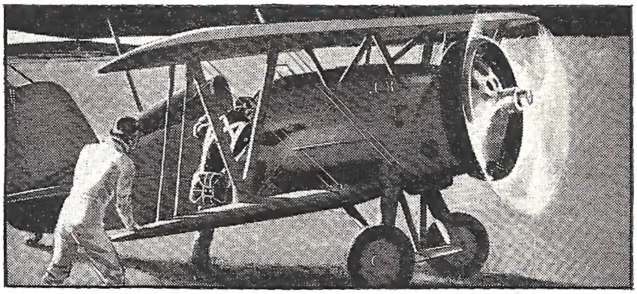
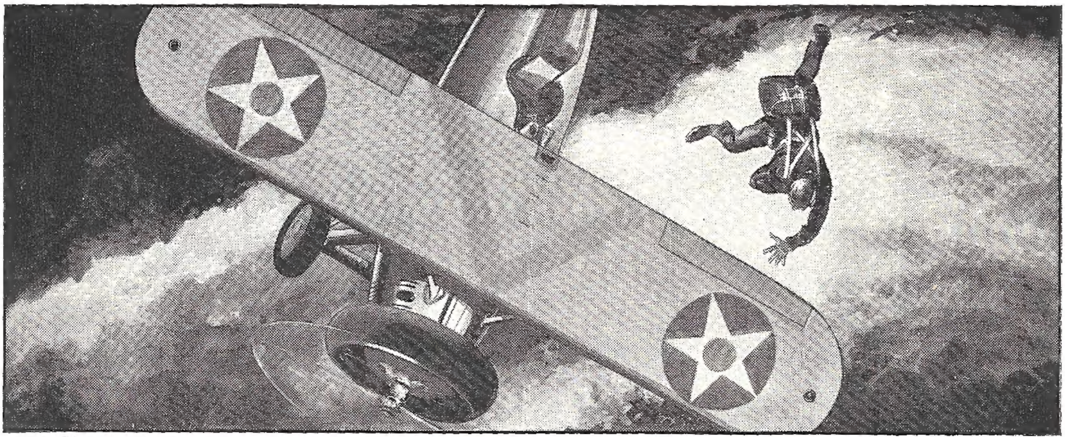
WILL SUBMARINES WIN THE WAR?

C. W. HARBERT
Aviation Cadet
Bristol, W. Va.

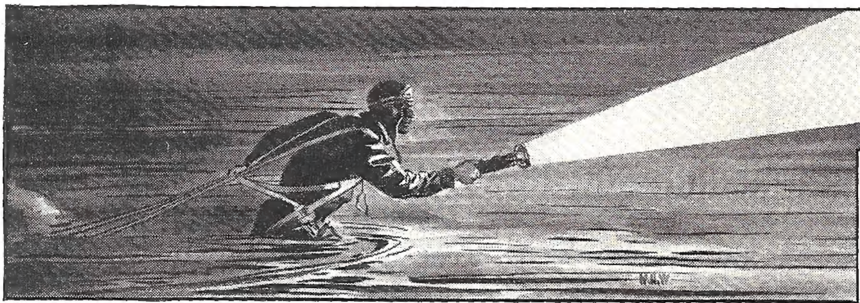
"I HAD TO BAIL OUT IN A PEA SOUP FOG!"



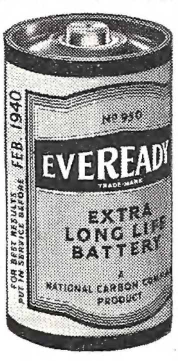
① **"I took off** from Pensacola on a night training flight in my single-seater fighting plane," writes Cadet Harbert. "Later, as I started homeward, a heavy fog rolled in. The landing field was blotted out!



② **"It was too dangerous**—for myself and those below—to attempt a landing. I had to bail out in that pea soup fog! Heading for open country, I circled at 5,000 feet until the gasoline gauge showed empty, then jammed the stick forward and catapulted into space!



③ **"I landed waist-deep** in the wide mouth of a river. Marooned by deep water on all sides, I grabbed my flashlight, and—despite the soaking—it worked! Guided by its beam, two fishermen eventually found and rescued me—thanks to 'Eveready' *fresh* DATED batteries—which you can depend on in emergencies! (*Signed*) C. W. Harbert"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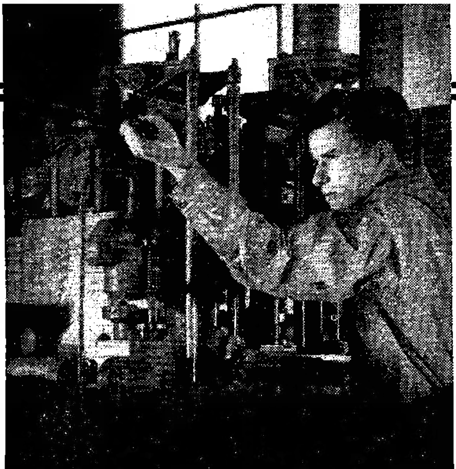

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Number 2

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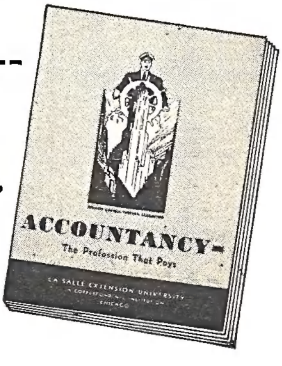


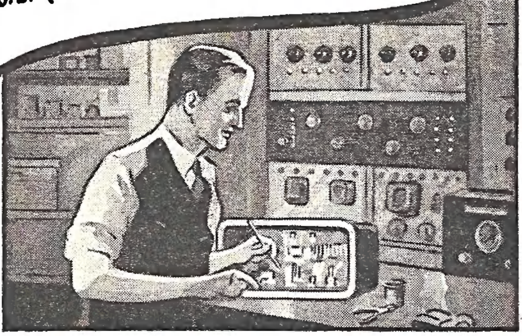
I Jumped from $18 a week to $50

--A FREE BOOK STARTED ME TOWARD THIS

Good Pay in Radio

--- HERE'S HOW IT HAPPENED

by S.J.E. (NAME AND ADDRESS SENT UPON REQUEST)



"When I finished training I accepted a job as serviceman with a Radio store. In three weeks I was made service manager at more than twice what I earned in the shoe factory."

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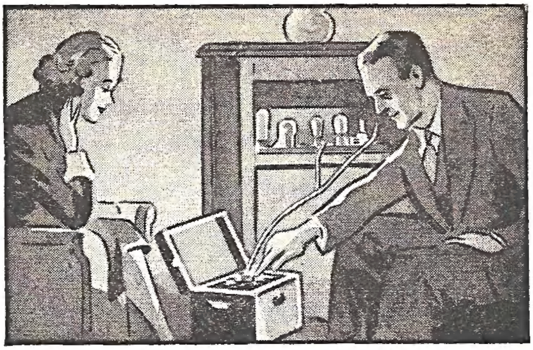
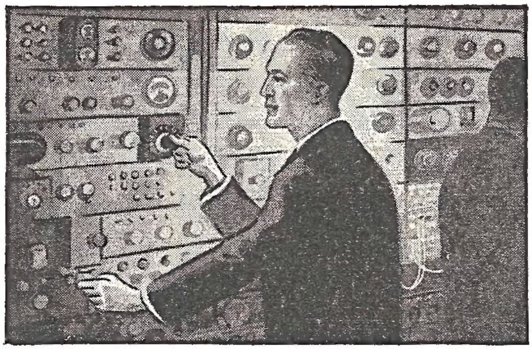
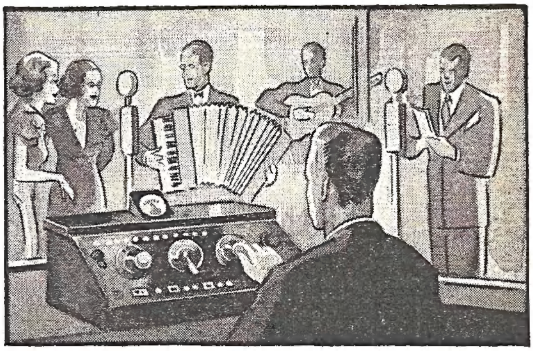


"I had an $18 a week job in a shoe factory. I'd probably be at it today if I hadn't read about the opportunities in Radio and started training at home for them."

"The training National Radio Institute gave me was so practical I was soon ready to make $5 to $10 a week in spare time servicing Radio Sets."





"Eight months later N. R. I. Employment Department sent me to Station KWCR as a Radio operator. Now I am Radio Engineer at Station WSUI. I am also connected with Television Station W9XK."

"N. R. I. Training took me out of a low-pay shoe factory job and put me into Radio at good pay. Radio is growing fast."

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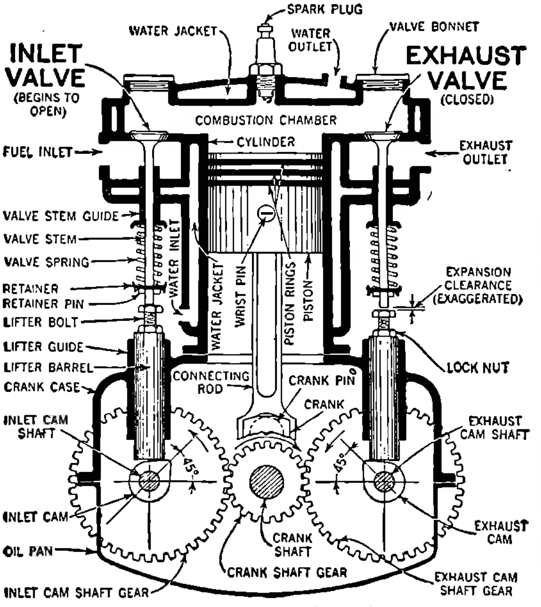
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WATER OUTLET
VALVE BONNET
INLET VALVE (BEGINS TO OPEN)
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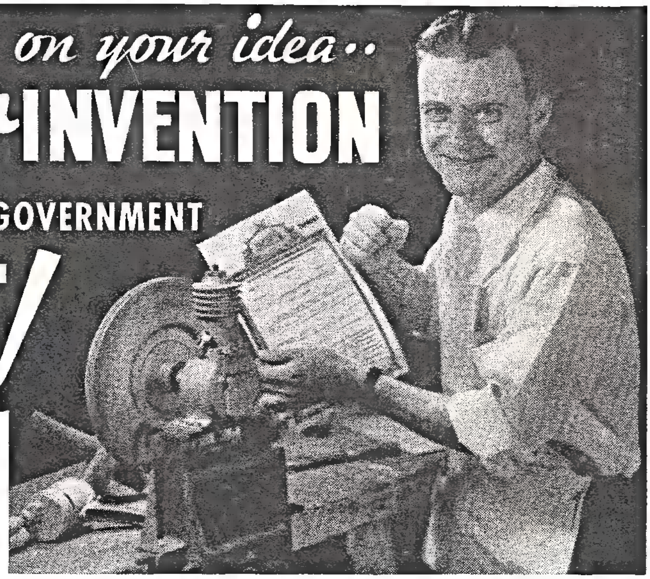

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CHIPS FROM THE EDITOR'S WORKBENCH

Fred I. Graham, secretary of the Cortland, N. Y., Musicians' Protective Association, wins first prize of $5 this month for the pipe organ he constructed. He is shown above, at the keyboard. The organ has five ranks of pipes, three of them with 61 notes each and two with 37 notes. Materials used were two kinds of metal and wood. The instrument has a tremulant, octave coupler and swell shutter, and by combining the different stops in several different ways a great variety of tones is produced. The volume ranges from a whisper to enough to fill a small church.

THE war of 1914-1918 forced the United States into its own manufacture of important dyes and other chemicals formerly imported from Germany. The new European conflict promises to break a similar German monopoly on high-grade cameras and related apparatus. At least that's my conclusion after making an extended trip through American centers of photographic activity. Existing factories are being expanded and ambitious production programs are on the books. One brand new factory for the manufacture of films and paper is being established in Williamstown, Mass.

Since American factory workers in this particular trade earn about four times the wages of German hands and enjoy much shorter hours, prices of domestically-made products are likely to be a bit high at first. They'll come down quickly, however, as tool and die costs are written off in sales.

What's the old gag about an ill wind blowing some good?

***

In last month's Workbench I made some pointed remarks about the poor distribution of plastics materials. I am most happy to report immediate progress. Bakelite materials are now being handled in New York by Patterson Brothers, whose immense general hardware store on Park Row is a favorite haunt of local hobbyists. I hope other cities will be favored similarily very soon.

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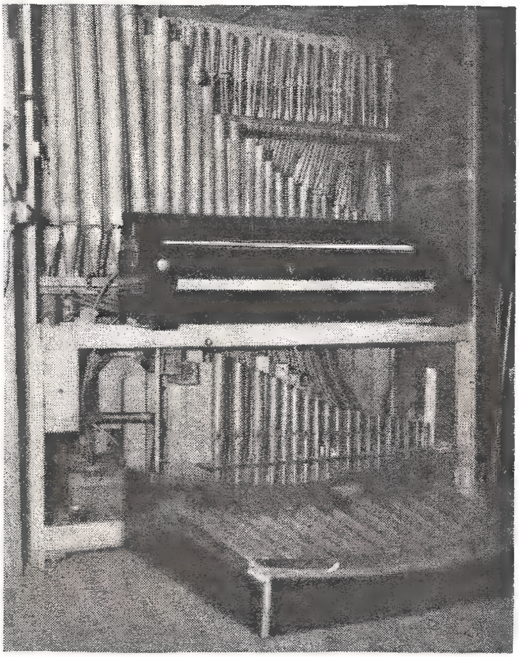

This is an interior view of the organ built by Mr. Graham, who is a piano tuner by profession. Five wind chests, key action, pipes, controls and all other parts of the organ except the two keyboards were built by him. The longest pipe is eight feet long and six inches in diameter and the shortest is one and 5/8 feet long and 1/4 inch in diameter. Each of the 300 odd pipes is connected by rubber tubing to its respective key, over 500 feet of tubing being used. Wind pressure is produced by a motor driven, three stage blower 19 inches square and seven deep with an equalizing bellows, giving a constant pressure regardless of the number of stops pulled.

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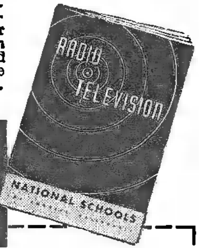

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Editor's Workbench Chips

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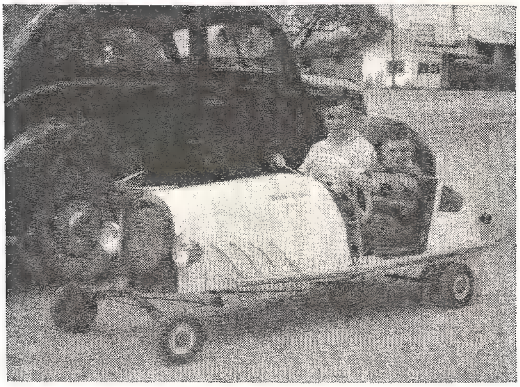
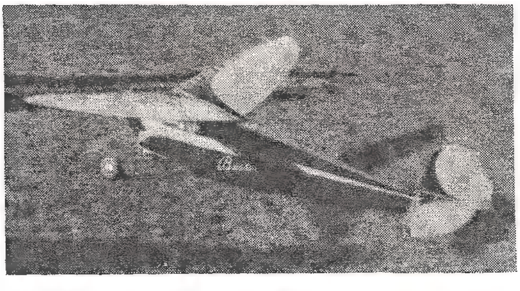


Howard Holmes, in the mechanic's seat above, and his small brother, Charles Dale Holmes, at the wheel, built this midget auto, the White Oak Special, to win a $3 prize. The boys live in Greggton, Texas. The car weighs 220 pounds and its license cost only 84 cents. It will do 20 miles an hour and will cover 84 miles on a gallon of gas. Salvage parts found around a garage were used in its construction. The power plant is a one horsepower engine which cost $37.23.

Our indefatigable camera fan readers are always writing in to inquire as to the camera and film, shutter speed and opening, etc., used in the making of this picture or that appearing in the magazine. My invariable answer is, "What good will this information do you?" Might just as well ask a successful author the make of his typewriter or the color of the paper he writes on. A camera is a tool; if *you*, the owner, use it intelligently and correctly, you'll get good pictures. Don't think you can duplicate some stunning salon shot merely by using the same film and exposure.

If you really want to learn how to take and make good pictures, by all means visit the nearest newsstand and pick up a copy of the current issue of PHOTOGRAPHY HANDBOOK. This companion publication to MECHANIX ILLUSTRATED contains 144 pages devoted exclusively to photography and sells for only 50 cents. If you want to see some examples of beautiful pho-

[*Continued on page* 16]



Buster Meeteer of the university city of Madison, Wis., sends in a picture of his gasoline model airplane which he named the *Buster* after himself. For his work he gets an award of $3. The plane is 53½ inches in length and has a wing span of six feet. The power plant is a 1/5 horsepower engine. The *Buster* has had 26 successful flights, its builder reports.

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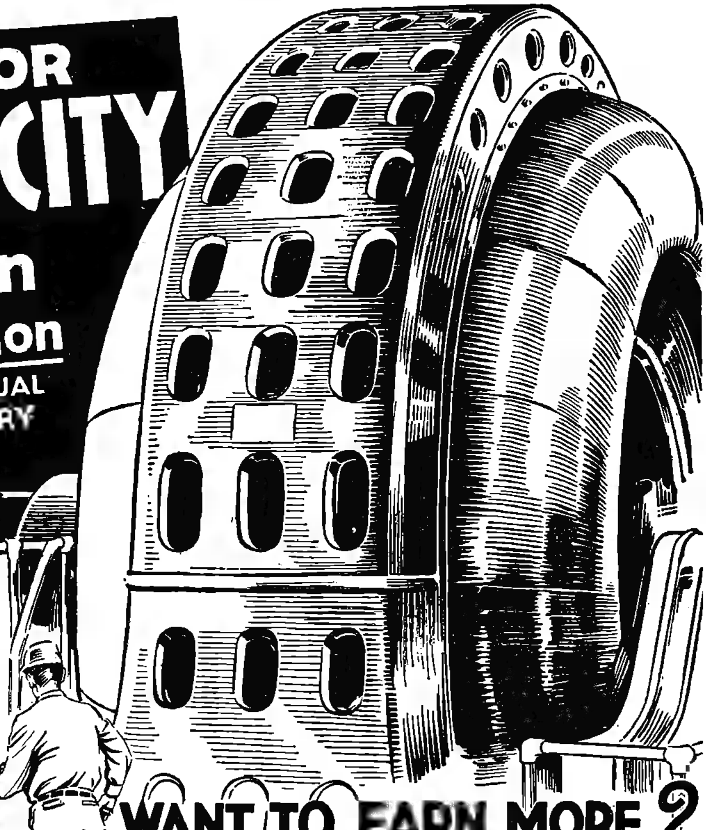

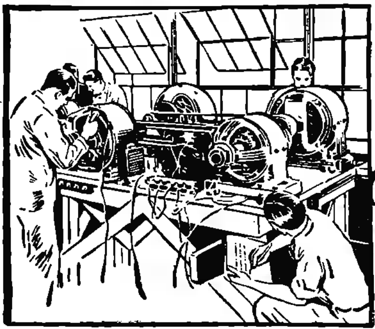

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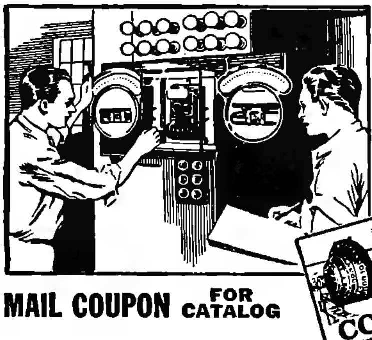

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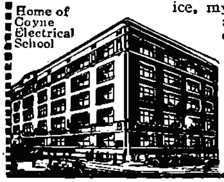

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Editor's Workbench Chips

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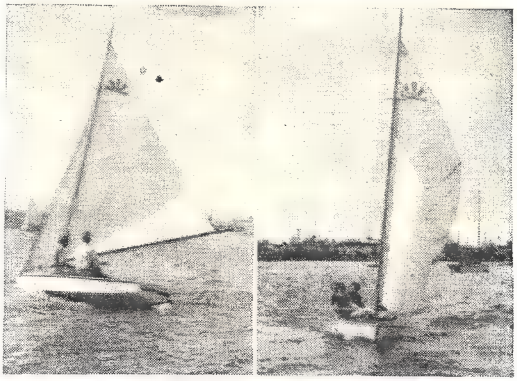

The *Sun Ray,* a snappy looking sailboat, wins an award of $3 for C. E. Ware of Sierra Madre, Calif. The deck is made of tempered masonite, which cuts down the boat's weight, and the centerboard is of metal. The craft has a hollow type mast and tee type boom and was built at a total cost of approximately $100, including the tailor made sails. The boat handles well, Ware reports, having very little weather helm and plenty of speed.

tography by the best picture-takers in the country, you might also invest in a copy of GOOD PHOTOGRAPHY. These two fat books will keep you absorbed until the small hours of the morning.

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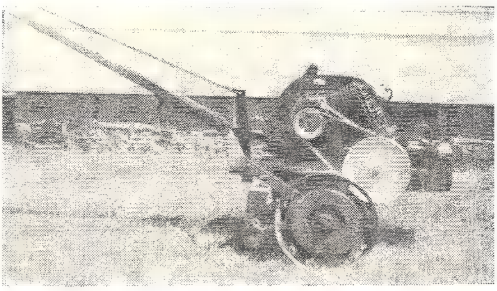

From Dewey Hosteller of Topeka, Ind., comes this photo of a powered lawn mower he built, thereby winning himself an award of $3. The power plant is a washing machine engine. Drive mechanism is a V-type belt, two bicycle sprockets and a chain. The mower has a sliding clutch on the handle, a very satisfactory arrangement, Dewey reports.

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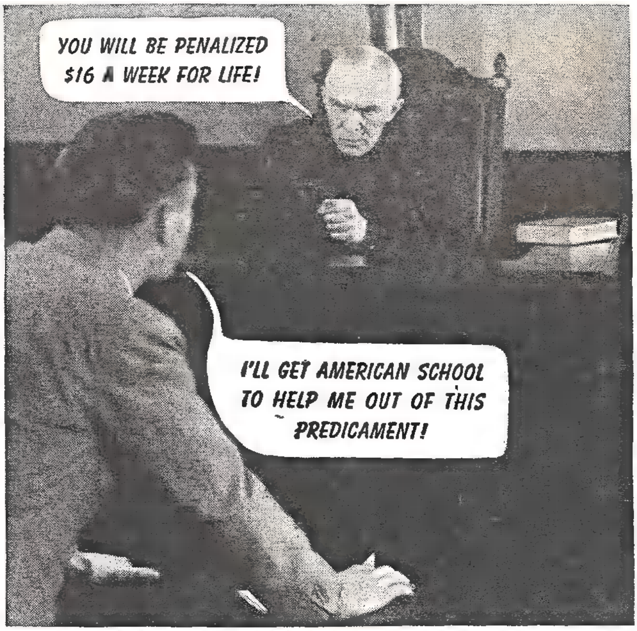
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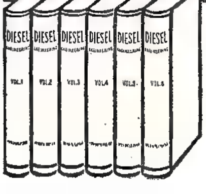

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of MECHANIX ILLUSTRATED published monthly at Louisville, Kentucky, for October 1, 1939.

State of Connecticut }
County of Fairfield } ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Roger Fawcett, who, having been duly sworn according to law, deposes and says that he is the Business Manager of MECHANIX ILLUSTRATED and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Fawcett Publications, Inc., Greenwich, Conn.; Editor, Robert Hertzberg, Jackson Heights, N. Y.; Managing Editor, Ralph Daigh, Larchmont, N. Y.; Business Manager, Roger Fawcett, New Rochelle, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Fawcett Publications, Inc., Greenwich, Conn.; W. H. Fawcett, Pequot, Minn.; Roger Fawcett, New Rochelle, N. Y.; W. H. Fawcett, Jr., Springdale, Conn.; Marion F. Bagg, Tulsa, Okla.; Gordon Fawcett, Los Angeles, Calif.; Roscoe Kent Fawcett, Port Chester, N. Y.; Frances M. Fawcett, Pequot, Minn.; Margaret Connor, Seattle, Wash.; Clarence Fawcett, Portland, Ore.; Gloria Fawcett Trust, La Jolla, Calif.; Virginia Lee Fawcett Trust, Los Angeles, Calif.; John Fawcett Trust, Los Angeles, Calif.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

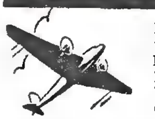
5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is ———. (This information is required from daily publications only.)

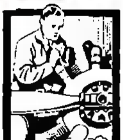
ROGER FAWCETT,
Business Manager.

Sworn to and subscribed before me this 26th day of September, 1939.

[Seal] DOROTHY C. ZIPF,
Notary Public.

(My commission expires November 9, 1943.)





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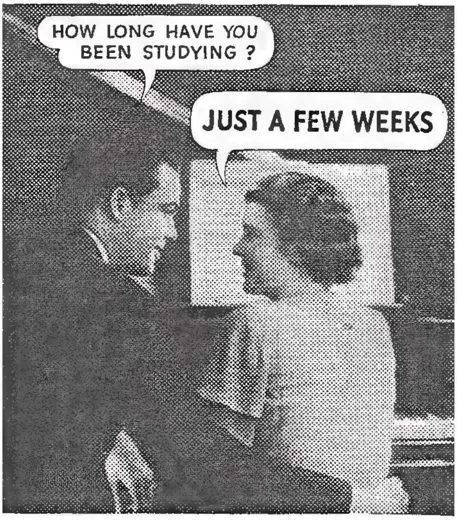
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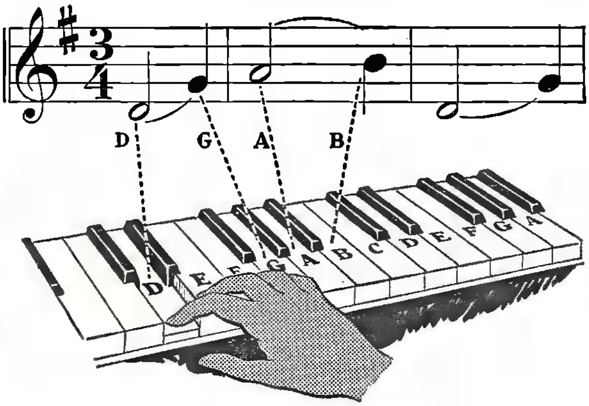

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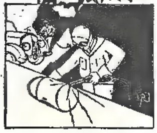

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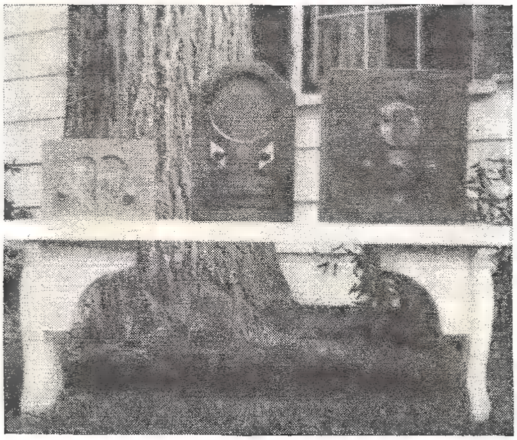
Editor's Workbench Chips

[*Continued from page* 16]



Fred H. Otis of Andover, Mass., whose hobby is radio, sends in this picture of three sets he built. The one at left is a four-tube set, its cabinet made of gum plywood. It is painted with royal blue enamel, cloth is of gold brocade and knobs of gilt bakelite. The middle set is made from two radios combined and has a drawer in its cabinet to hold cards, pencil and paper and other articles. The set at the right has an opening underneath which may be used for a bed light. Across its speaker grill the first name of Mrs. Otis is carved.

Our sincerest apologies to all of you who wrote in for MECHANIX ILLUSTRATED blueprint catalogs and didn't receive them for a few weeks. We didn't expect quite such a deluge of requests, and our initial supply was mailed out in a couple of days. All requests are now being filled immediately upon receipt.

This new catalog is a handy little thing to have around the shop. It's free, of course; but for Pete's sake please write your name and full post office address clearly.

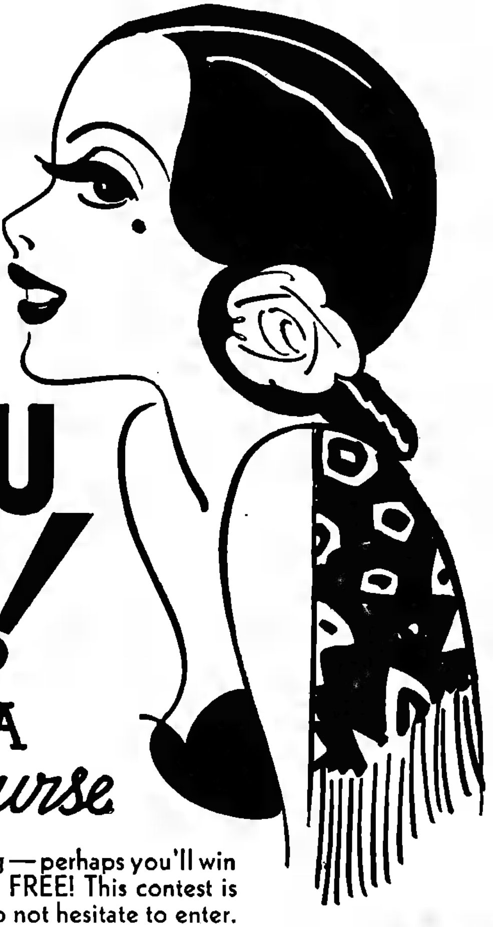
***

A teacher friend of mine who recently returned from a sabbatical year in Europe remarked to me that the most noticeable difference between street scenes in American and European cities (aside from auto traffic) is the startling absence here of soldiers in uniform.

That's not very surprising, I explained, in view of the fact that the United States Army is down around 17th place among the armed forces of the world. Furthermore, our heaviest individual concentrations of troops are in remote places such as Hawaii and the Canal Zone. The rest are distributed thinly over the vast expanses of the 48 states, so the public rarely sees more than a few detachments at a time at civic ceremonies, parades, etc.

A recent action of Congress will shortly raise the Regular Army to 227,000. More important than a mere increase in strength is a complete "streamlining" of the Army's fundamental organization. In place of the former cumbersome

[*Continued on page* 23]



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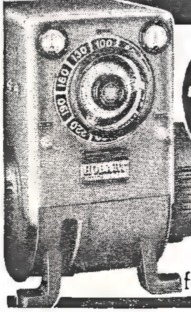

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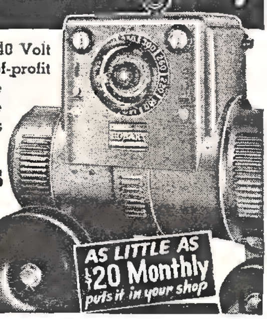

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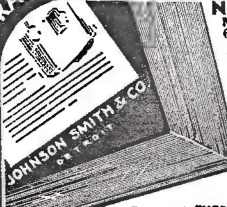

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Editor's Workbench Chips

[*Continued from page* 20]

A check is winging its way to Edward Hutson of Muskegon, Mich., for his home built garden tractor. Axle, wheels, frame and handles were made from parts of a Model T. Ford. The power is supplied by a Delco light plant air cooled motor. The width of the tractor is 32 inches, and it has a clearance of one foot. A transmission with a 50 to one ratio is used to reduce speed to a slow walk. The motor is connected with the transmission by a belt fitted with a tightening lever that operates as a clutch.

divisions of 27,000 men, there will be fast-moving divisions of only 11,000. We'll tell you more about this in an interesting article now being prepared for next month's MECHANIX ILLUSTRATED.

***

This article will also include full data on the Army's latest weapons. Did you know, for instance, that the long-famous Springfield rifle is finally being replaced by the Garand, a self-loading job that fires eight 30-'06 cartridges as fast as a man can squeeze the trigger? Eventually, this means that a lot of perfectly good Springfields will be released through the Director of Civilian Marksmanship at low prices, and home shops in every corner of the country will be busy converting them into beautiful sporting rifles.

By the way, how many of you would like to see an article telling how to do this job? There certainly shouldn't be anything difficult about it. Drop me a line and let me have your general ideas on the subject.

***

This may not sound like the appropriate time of year to discuss air-conditioning, but many readers evidently want to prepare themselves now for next summer's hot weather. Every mail brings us requests like this: "Please publish construction dope on a simple air-conditioner that can be made in the home shop."

The trouble is that there is no such thing yet as a *simple* air-conditioner. In most parts of the United States the main function of air conditioning is not so much to reduce the temperature of the air as it is to lower its moisture content. Up to a certain point, dry heat alone is quite bearable, but moderate heat accompanied by heavy

[*Continued on page* 25]

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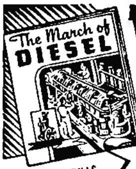

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Editor's Workbench Chips

[*Continued from page* 23]

mugginess makes everybody squirmingly uncomfortable.

Real air-conditioning also requires virtual rebuilding of a house. All the windows must be closed up tight, and separate intake and exhaust vents must be installed so that cool, dry air can be pumped in and kept circulating properly without going stale.

In certain sections of the arid Southwest, where the air becomes both excessively hot and dry at the same time, a crude but effective room "cooler" can be made by placing an electric fan behind a slowly dripping flow of water from a faucet. It is an old principle of physics that evaporation of a liquid requires the expenditure of heat; that's why your skin feels deliciously cool when you spill alcohol on it and allow it to dry. Let the fan blow the dripping water out as a fine spray, and in the process of evaporating it will rob the surrounding air of some of its heat. Simple, isn't it? But don't try it if you can feel the slightest trace of perspiration on your skin. The water won't evaporate very well if the air is already laden with moisture, and you'll only make conditions worse.

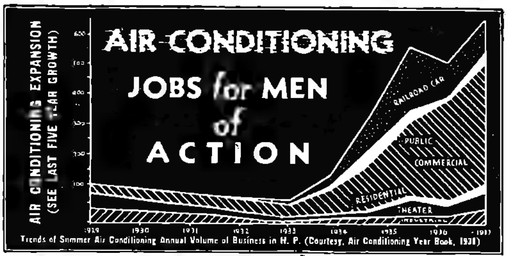
I had the privilege of attending a private little meeting arranged by the New York World's Fair for science editors and writers, just before the 1939 closing, and I can tell you that next year's show will be run altogether differently. A new management, headed by a hard-headed banker, is frankly out to correct the many errors of its predecessors, who showed an appalling ignorance of mass psychology and earned for themselves what is known as a "bad press."

The 1939 Fair was a marvelous show, and the 1940 one will be better. Plan now to attend it.

* * *

The air outside is cold, the basement shop is nice and warm. As you finish those projects, send in pictures of them, for publication in this department.

—*Robert Hertzberg, Editor.*



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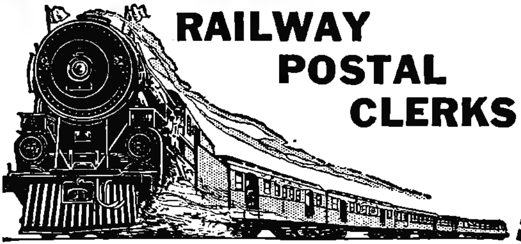

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Bigger and better cotton, tobacco, berries and fruits, with new chemical-created heredities, are about to result from U. S. Department of Agriculture research through use of a powerful and poisonous drug, colchicine, in the most promising plant breeding experiments in years.

Fertile hybrids of economically important plants are being produced, successful plant crosses heretofore impossible are being achieved.

From pioneering experiments by Dr. Albert F. Blakeslee, Carnegie Institution geneticist several years ago, the application of colchicine, extracted from seeds of the wild meadow saffron and used sometimes as a gout remedy, promises to give farmers better plants to grow in their fields.

The drug causes rapidly growing young plants to double the number of chromosomes in their cells, juggling the heredity in such a way that the new plant created breeds true and is not sterile as are most hybrids. Chromosomes are the carriers of heredity within the cells and seeds.

Crossing of valuable Sea Island cotton of the Asiatic variety and American upland cotton is being undertaken by Dr. J. O. Beasley of the Bureau of Plant Industry, working in North Carolina.

For the first generation this cotton cross produces a form which gives the typical long fibers of Sea Island cotton with the early maturity of the American upland cotton. This hybrid, however, while fertile, goes to pieces after the first generation cross and loses its desirable qualities.

The drug colchicine, by doubling the number of chromosomes in the cells of the plant, allows the production of a fertile hybrid of the cotton that will breed true.

To get a true-breeding strain depends on a freak of nature found commonly in Sea Island and at times in upland cotton. It is a twin embryo. Usually one of the embryos produces a shoot with only half the number of chromosomes in one set instead of the regular two sets required for fertility. By doubling the chromosome number of this shoot with colchicine, the scientists hope to get a pure-line cotton with two sets of identical chromosomes which should breed true.

Dr. H. H. Smith at the Arlington, Va., U. S. Department of Agriculture Experimental Farm, has obtained similar results with hybrid tobacco which, in some forms, has great value as an insecticide. This is especially true of wild tobacco of which one type contains nor-nicotine, an alkaloid related to nicotine but much more potent in killing insects.

Drs. Haig Dermen and G. M. Darrow, working at Beltsville, Md., have tried colchicine on berries and fruit trees and hope to produce a permanently-reproducing cross between loganberries and ordinary blackberries. Crossing of red raspberries with other berries is expected to yield a variety that will grow in warm southern climates.

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Seek To Form Corporations For Alaskan Development

Formation of one or more private development corporations like the world-famous "Hudson's Bay Company" to people Alaska with American citizens and refugees and turn it into a prosperous "Scandinavia of the West" is suggested in a Department of Interior report.

A population of five million or more, the report maintains, can easily be supported in the territory which, one-fifth the size of the United States, now has less than 60,000 inhabitants, including Eskimos and Indians.

Opening up the territory to large-scale colonization would provide a market for American capital goods equivalent to a heavy increase in the U. S. foreign market, it is urged. At least half the settlers will be American citizens. Among the others would be carefully selected refugees from foreign lands. The plan would thus also be an American answer to European persecution of minorities.

Private development corporations like the Hudson's Bay Company, which settled Canada, and the Plymouth Company, which sent the Pilgrims to the then unknown wilderness of the Atlantic coast, have been the most successful type of colonizing agency. One or more of them is therefore recommended for Alaska. Their dividends would be limited and their activities carefully delineated by law. Financing would be entirely private.

Providing the plan secures support of Alaskans and others concerned, necessary legislation is expected to be introduced before Congress.

Present immigration laws would be modified so as to permit aliens selected by the companies to settle in Alaska. Immigration quotas of the United States would not be altered. If the Alaskan settlers wished to become citizens or to enter the United States, they would have to apply for immigration quota numbers like any other aliens.

The society the colonists would build would be based primarily on manufactures exploiting Alaskan resources. The industries either would not duplicate those of the United States at all or would produce goods of a type now largely imported. Among the industries are paper manufacturing, lumbering, salting and pickling herring, woodworking, production of minerals such as tin, manganese and chrome ores, fur farming and leather working. Agriculture can supply a substantial part of the new natives' food supply, although by no means all of it.

Alaska is potentially richer than Sweden and Finland together, a National Resources Committee report quoted by sponsors of the plan indicates. With an area two-thirds larger and far better endowed by nature than the two Scandinavian countries, it now supports a population 1/165th as large. Half the population is Eskimo and Indian.

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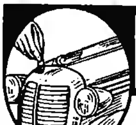

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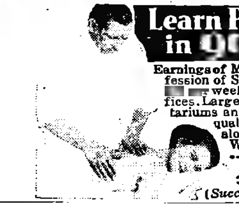

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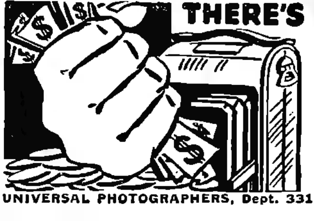

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Archaeologists Find Indian Buried Under 400 Arrows

A prehistoric Indian buried under 400 arrows, and honored by hundreds of offerings piled into his tomb, has been discovered by archaeologists exploring a small pueblo 20 miles east of Flagstaff, Ariz.

The burial, which occurred seven hundred years ago, is pronounced an important archaeological discovery by Dr. Harold S. Colton, director of the Museum of Northern Arizona, reporting the find.

Articles bestowed on this unknown figure of American prehistory include: 25 undamaged jars and bowls; a round basket covered with turquoise inlay made of more than 1,500 stones; two turquoise earrings inlaid with shell; a wand with inlaid turquoise end; thousands of shell and stone beads; rattles; shell tinklers; red, green, and blue paints; sticks carved with human hands and hoofs of deer; abalone shell brought from the Pacific coast. Many objects are damaged by moisture.

As a tomb for this Indian, a chamber had been excavated under the floor of an abandoned room. After the gifts were placed with the body, Indians had thrown 400 arrows on top and roofed the chamber with juniper poles and a covering of trash.

The tomb was discovered by an expedition of the Museum of Northern Arizona led by J. C. McGregor of the Museum, in cooperation with WPA. Finding the burial is credited to Milton A. Wetherill, assistant archaeologist.

U. S. To Have 70,000 Licensed Air Pilots By End Of 1941

The United States will have 70,000 licensed pilots of all classes by the end of 1941, it is forecast by Robert H. Hinckley, chairman of the Civil Aeronautics Authority.

In reviewing the work of the CAA in the first year of its existence Mr. Hinckley said, "Today 26,144 pilots hold certificates, 6,000 more than a year ago. . . . Even without the Authority's own pilot training program, the curves (of the CAA) show that there would be 36,000 certificated pilots by the end of 1940 and 43,000 by the end of 1941. Taking into account the student training program, however, the number of pilot certificates in force by the end of 1941 ought to be approximately 70,000 in all classes."

By the new plan to train 10,000 pilots a year, under CAA direction, air safety should be increased, Mr. Hinckley indicated. While students who have completed the course so far number only a few hundred it has been found that they have bettered by more than 50 per cent the safety ratio of all private flying during the past year. The addition of 10,000 safely trained pilots per year will greatly raise safety levels in private flying, it is believed.

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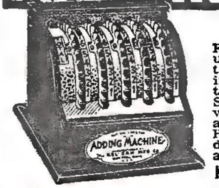

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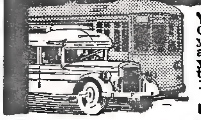

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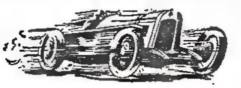

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Negroes Winning Survival Race In American Tropics

A racial struggle in America fought, not with guns, but in biological terms of the survival of the fittest, is being won in northern South America by African Negroes.

Losers in the struggle, Choco Indians of the Pacific coast of Colombia, are apparently doomed to extinction, reports Dr. Robert Cushman Murphy of the American Museum of Natural History to the Geographical Review. In one section of Choco country there is now one Indian to every 160 Negroes.

Calling the Negro "the fittest heir of the Choco," Dr. Murphy states:

"Transplanted from Africa, the Negro has become, [redacted] regards survival, [redacted] 'native' superior to his predecessor, even over the obstacle of a greatly inferior sanitary code."

Dr. Murphy points out that the African is more resistant to white man's diseases than the Indian. Also, the African's traditional "million years" of selective evolution in the hot and humid Congo may help to explain why the Negro in Colombia's tropics thrives, while the Choco Indian with [redacted] mere 10,000 years of tropical heritage, at the most, is retreating farther into the interior and dwindling in numbers.

Psychological and psychic weapons of the struggle give the African another advantage. The Negro considers himself a Colombian, and the Indian a savage. This attitude stems from the Negro's association with white men, and his adoption of the Spaniard's language and attitudes. Magic power of the Negroes is held in universal awe by the Indians, who fear evil eye power that supposedly [redacted] kill fish by [redacted] glance or cause children to fall ill. Indians, on their side, arouse fear in the Negroes by their lore of poisons, and their handling and "planting" of deadly snakes to do harm. But the psychic advantage is on the Negro's side, Dr. Murphy concludes. One of the most horrible demons in Choco Indian lore has taken on the guise of [redacted] Negro.

Claims Safety Plate Glass Will Prevent Car Sickness

The use of safety plate glass on all the windows of motor vehicles will help prevent many cases of "car sickness" and the headaches accompanying eye fatigue, it was announced here today by Dr. A. H. Ryan, Chicago physician. Eye fatigue, he finds, is 62 per cent greater when looking through safety sheet glass than it is when looking through safety plate glass.

The tiny, almost imperceptible waviness of sheet glass, in contrast to the polished smooth surface of plate glass, distorts the vision, Dr. Ryan has found in laboratory as well [redacted] driving tests.

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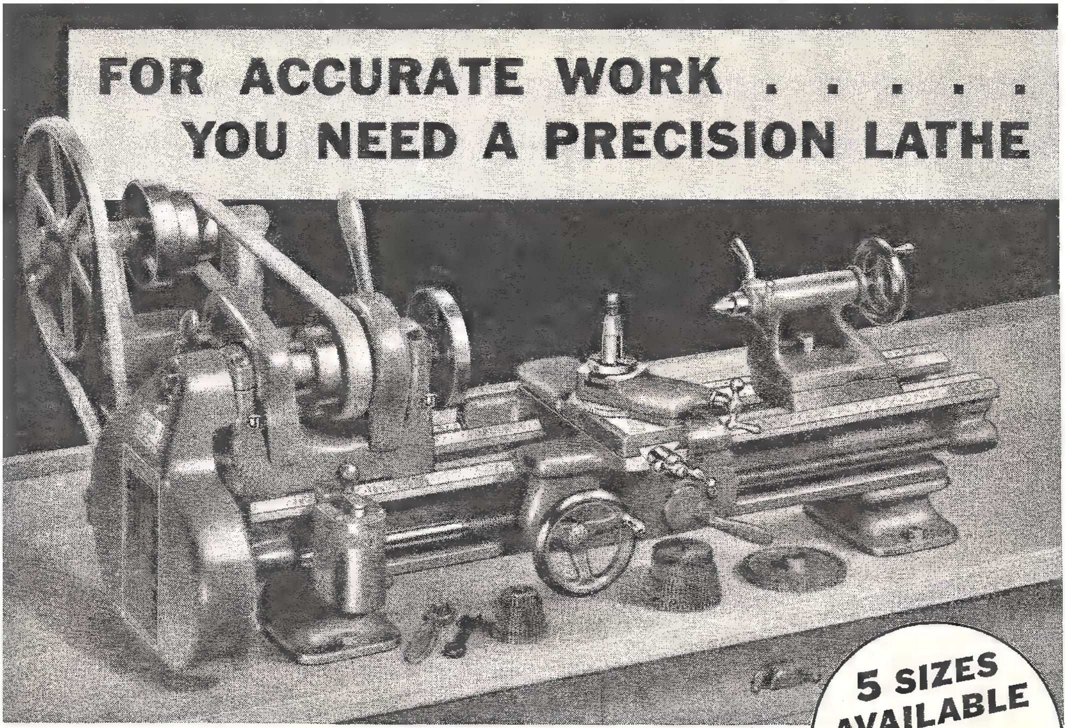

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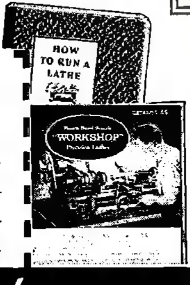

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December
1939

Hubert and Curtis Stevens flash round a curve in one of the record smashing heats that brought them the Olympic championship.

We Broke The BOBSLED RECORD

by J. Hubert Stevens

Olympic Bobsled Champion

Records fell fast when the author of this article, representing the U. S., and Reto Capadrutt, daring Swiss, fought out their thrilling Olympic bobsled duel on the slopes of Mount Van Hoevenberg.

RETO CAPADRUTT, sensational 20-year-old Swiss university student, and his 50-year-old partner, Oscar Geier, were burning up the Mount Van Hoevenberg run in the two-man bobsled event of the 1932 Olympic Games at Lake Placid, New York. Their closest rival was the American team which consisted of my "little" brother Curtis, who weighed more than 200 pounds, and myself.

But we had gone down the icy slopes in the slow time of 2 minutes 13.1 seconds in the first heat, compared to the record smashing 2 minutes 5.88 seconds for the Swiss, thereby giving them the almost insurmountable advantage of nearly eight seconds. Yankee

The Stevens brothers, all four of 'em have been bobsledders since they wore short pants. Below, front to rear, are Paul, Hubert and Curtis long before they reached the mile-a-minute stage. Right, front to rear, are Curtis, Paul, Raymond and Hubert as they look today.

ingenuity would have to contrive some means of speeding up our sled and contrive it mighty soon, or the championship in this race would go to Switzerland.

The weather was cold and the ice was very hard. Ice is slow when it is in that condition but fastest when the temperature is near its melting point of 32 degrees Fahrenheit. If I could think of some way to boost the temperature of the ice while I was going down the run, I could fairly fly down that mountain. But how?

Suddenly I thought of a blowtorch. If I applied enough heat with a blowtorch to the steel runners, they would hold that heat long enough to soften the ice during our dash down the twisting slope. I reviewed the rules in my mind to recall if there was any rule against applying heat to the runners. I assured myself there was none.

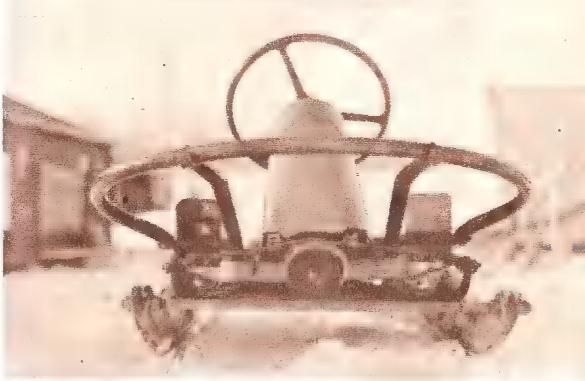
So just before we were scheduled to start the second heat, while curious spectators and officials looked on, I gave my runners a good dose of heat.

For the second time that day a world record was broken, as our sled, with Curtis at the brake and me steering, went down through that tricky series of curves and twists to the finish line in 2 minutes 4.27 seconds. Capadrutt made his descent in 2 minutes 7.21 seconds. We had lopped almost three seconds off his advantage, which was good but not good enough. At the finish of that race practically everyone was conceding ultimate victory to the Swiss.

I studied Capadrutt's sled. His runners had a slight curvature or "rock" while mine were flat. This undoubtedly contributed to his speed. So I took my sled to my workshop and spent most of that night filing down my runners until each contained a rock.

This treatment plus more work with the

Above: Bobsledders take good care of their sled runners, as a small defect may mean a great loss of speed. Below: Racing bobs should have a sturdy but flexible steering apparatus.



BUILD A BOBSLED!

Enjoy the thrills of bobsledding this winter without the dangers by constructing the simple seven man bob shown on page 86! This naturally, is not a professional racing machine, but it has speed a-plenty and will travel on any type snow surface. Steers just like the racers.

Above: Robert J. Linney and his Iron Men race down Mount Van Hoevenberg to victory in four-man tryouts for the 1940 Olympic team. Below: Hazel Franklin, 13-year-old English figure skating star, congratulates Linney and his men on being chosen the number 1 United States team.

blowtorch showed results in the third heat, when Curtis and I sped down the mountain in one minute 59.69 seconds to knock the world's record for another loop. Capadrutt did it in the fast time of 2 minutes 3.52 seconds. We had cut his advantage to about half a second, but we both knew well that the final heat would tell the story. The youthful Capadrutt, driving like a tried and true veteran, would be dangerous until the last finish line was crossed.

The crowd stood tense, as the starter waved his red flag. Loud speakers were installed all along the course to inform them of the progress of the race. Curtis, his legs driving like pistons, put all the power of his 200-pound bulk into giving us a running start, then jumped into his seat on the rear of the sled.

Down the straightaway we whizzed into the first turn, Eyrie, and through it in 28 seconds. Curtis forgot there was such a thing as a brake. Instead of using it, he bobbed forward and back to give us still more speed.

We tore into White Face curve, a wall of windblown ice 30 feet high. We were through it in 50 seconds flat. Next came Cliffside in one minute 6.4 seconds.

We reached our top speed, about 65 miles

Above: Bob Washbond, brake, and Ivan Brown, driver, both of Keene Valley, N. Y., won the two-man championship for the U. S. in the 1936 Olympics. Right: The United States team composed of Jay O'Brien, Billy Fiske, Eddie Eagan and Tippy Gray, gets sled runners in shape for a dash down the mountain.

an hour, when we hit the famous Shady Corner, a hairpin curve which is vertically banked. I was using all the strength of my knees as well as my hands to steer. We went through Shady in one minute 25 seconds.

Then came Zigzag, a treacherous reverse curve, most dangerous on the run. Disdaining caution, we sped into it in one minute 45.2 seconds.

Twelve seconds later we raced across the finish line with another world record. Our time for the run was one minute 57.68 seconds, our total time for the four heats 8 minutes 14.74 seconds.

Capadrutt threw a scare into us in his final run. He made it in the fast time of one minute 59.57 seconds, which was better than any of our times except the last. We were Olympic champions by a margin of only a second and a half.

Disaster struck two German four-man teams during practice runs before the start of the 1932 Olympics. Captain Werner Zahn came to grief on Zigzag, injuring himself and his three teammates seriously.

Two days later Captain Fritz Grau, driving in a blizzard that limited visibility to 30 feet, went into a bad skid while blazing into Shady at close to 70 miles an hour. He tried desperately to come out of it, but failed. The big sled rocketed over the edge and crashed into a tree. From there it rebounded into a rock filled gully, scattering its four riders in all directions. Three were badly injured.

Disaster also struck the gallant little Capadrutt at St. Moritz last February—fatal disaster. His sled crashed into a tree and he died soon afterward from head injuries.

Such accidents cause people to point to bobsledding as one of the most dangerous sports, but I would not call it particularly risky. Serious injuries and fatalities are no more common in bobsledding than in other vigorous outdoor sports. Even such comparatively safe sports as baseball and golf have their casualties. As an example of how safe the Stevens family considers bobsledding, my mother rode down the Mount Van Hoevenberg run with me and two of my brothers when she was 70 years old.

I have had several spills and thrilling

Right: The German bob driven by Captain Fritz Grau is wrecked in a rock-strewn gully after going over the top of Shady Corner. Its four riders went to the hospital.

moments in my many years of bobsled racing but none of them ever resulted in serious injuries. One of these spills cost the United States four-man team, which I was driving, the championship at the 1936 Olympics in Germany.

The United States team was a two to one favorite to win the four-man event that year even without the help of blow-torches, which had been ruled out. Warm weather and frequent thawing, however, hampered practice on the Garmisch run. To protect the soft ice of the run from sharp sled runners, snow was left on it until the day of the opening heats.

Shady Corner looks like this during the warm months. The bobsled is held in position by blocks and cables.

Snow slows up a run considerably, and as a result when the snow was removed it was like getting used to an entirely new and much faster run. I tried to round the Bavarian curve, a hairpin turn which was the sharpest on the run, at too rapid a pace. The sled went into a skid and turned over. None of the crew was hurt and we righted our sled and continued on down the run. But the spill delayed us a good 10 seconds and that was enough to defeat us. We finished fourth in the total time of 5 minutes 24.13 seconds for our four heats, which was less than five seconds slower than Musy, the Swiss driver, who won the event in 5 minutes 19.85 seconds.

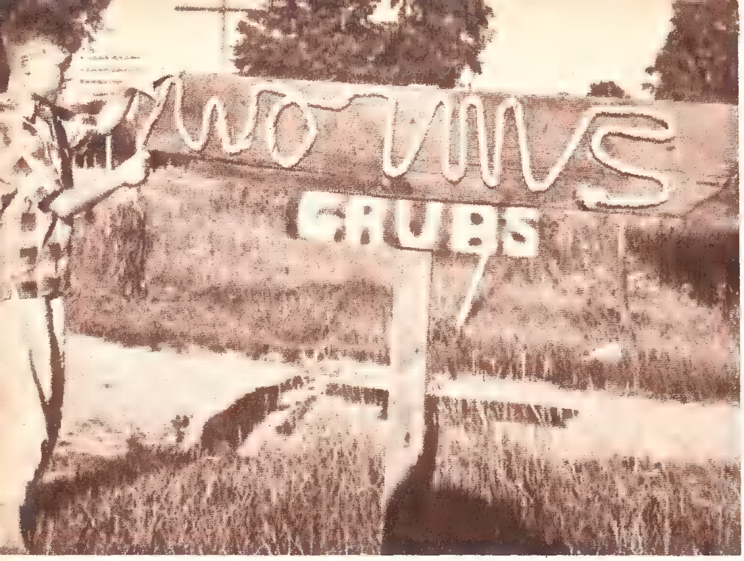
I had a close shave one time on Mount Van Hoevenberg when my goggles fogged over, blinding me. The heat of the body on the inside of the goggles and the cold outside not infrequently causes fogging. By the time I reached Shady Corner there was only one little break in the fog through which I could see. I managed somehow to get around Shady, but I knew I was going to have to pull off my goggles before I went into Zigzag.

Pulling off your goggles while piloting a bobsled at 65 miles an hour is no cinch, because you need all the strength of both your arms to keep the heavy sled on its course. I reached up quickly after leaving Shady and yanked away my goggles in an instant.

But that instant was enough for the sled to get out of control. It rocketed up the steep

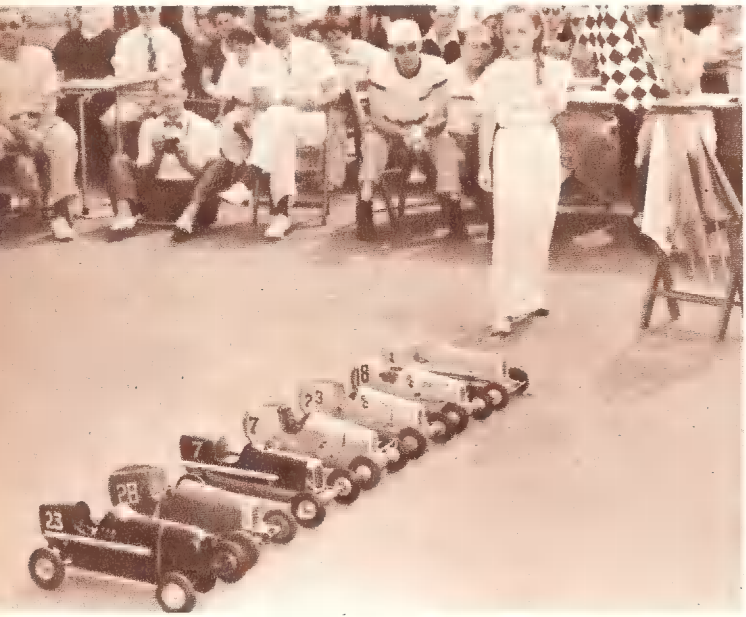
[*Continued on page* 123]

A four-man bob speeds around Whiteface curve's 30-foot wall of glare ice.



Makes Novel Sign To Boost Sales

THE enterprising young fellow in the photo at left made his spending money during vacation days by selling worms and grubs to fishermen. Realizing that to do a good volume of business he must have good advertising, he hit upon an attractive scheme that is quite out of the ordinary. He tacked to a signboard a length of rope, coiled so that it spelled the word "WORMS."



Midget Cars Race At World's Fair

THESE midgets are shown lined up before the start of a race in the Court of Peace at the New York World's Fair. Seven-year-old Alice Sechto of Williston, Long Island, is acting as official starter. The tiny cars, attached to a central pole by a 52-foot wire, raced against time in individual heats in a circular course around the pole. The winner of the event was the white number 7, fourth from the left, which is owned by George Sechto of Williston.

Effect Of Water On Autos Tested

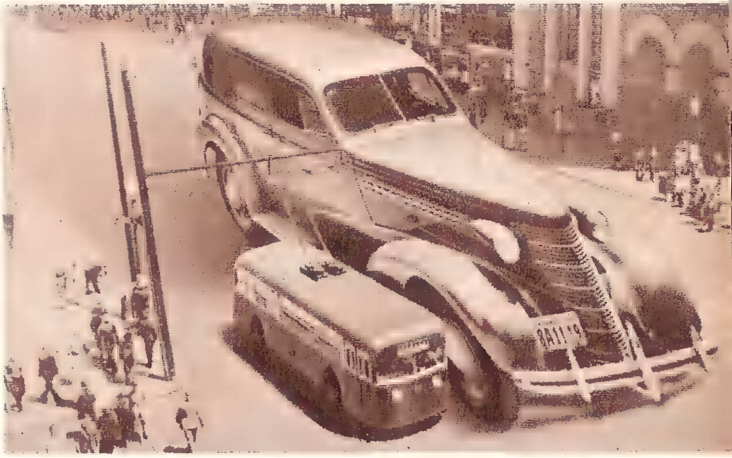
ALL Ford cars are now put through the water pit test, designed to determine the effect of water on brakes, to check tightness of underbody construction, to test controllability of cars when they suddenly strike pools of water on the road and to guide engineers in protecting ignition systems against flooding. Cars are driven into the pit at a speed of 60 miles an hour.

Fireproof Fluid Invented

A COLORLESS, odorless and tasteless fluid that will fireproof anything is the invention of an Italian chemist, Ricardo Campese. Photos show the effects of fire on an ordinary straw hat and on one that has been treated with the fluid.

Photo Of Big Car Booms Trollies

THE photo at right looks like a picture of Paul Bunyan's own car, but it isn't. It's a photomontage produced to advertise the traffic advantages of modern transit service. The average auto in the city carries 1.72 passengers against 40 for the trolley car. Under ordinary conditions autos carrying as many persons as can be seated in the trolley shown would occupy the street space of this gigantic car.



Fruit Inspected By X-Ray Machine

CALIFORNIA fruit sellers have developed an X-ray machine similar to a fluorscope to inspect the interior of fruit. Sound fruit appears dark, but fruit damaged by frost or granulations shows light spots. As the fruit passes through the machine on belts, the damaged fruit is kicked onto another belt by hand levers.

Above and below are front and rear views of the *Floyd Bean Special.* Bottom: The speedster is damaged when the landing gear collapses during a landing at 120 miles an hour.

New Air Speedster

A RACING plane with a wing span of only 12 feet has been designed and built by Tom Floyd of California. Due to its tiny span, the speedster, which has been named the *Floyd Bean Special* after Floyd and his pilot, Bob Bean, has a landing speed of 120 miles an

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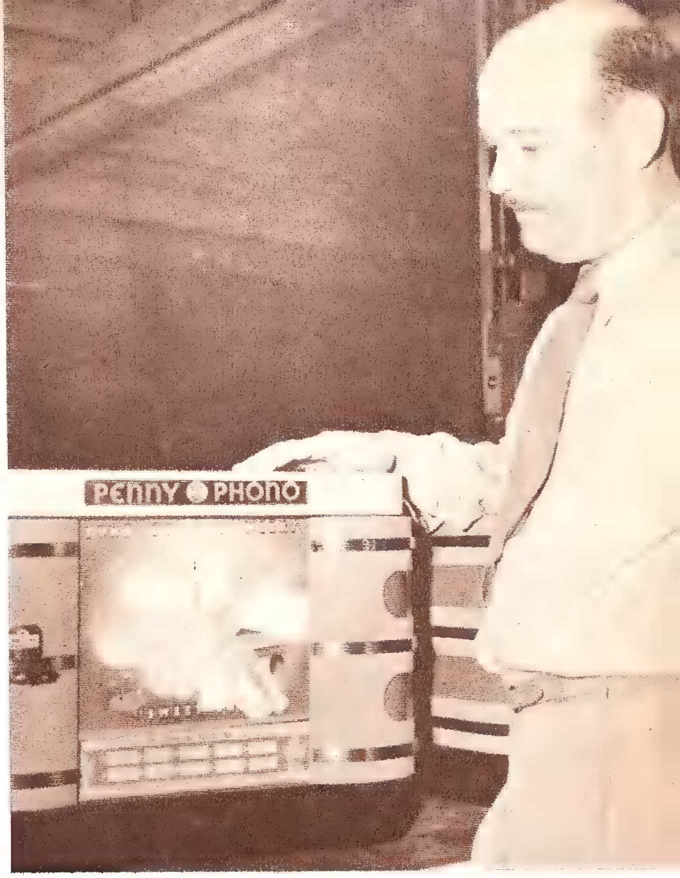


Develops Penny Serenader

AN AUTOMATIC phonograph that sells tunes for a penny each has been developed by Dr. G. K. Woodward, Los Angeles physician. Its 16-inch records have ten different songs on each side.

California Gives Iowa Competition

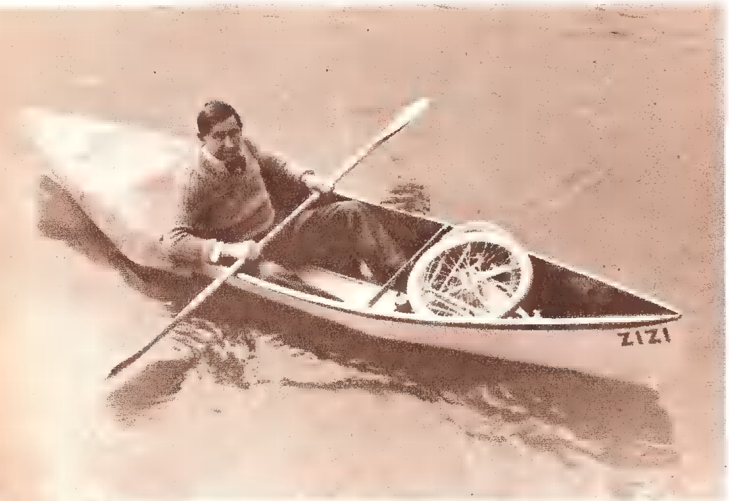
CALIFORNIA, so say the Native Sons, can give Iowa a run when it comes to growing corn. The California corn shown above is 20 feet tall.

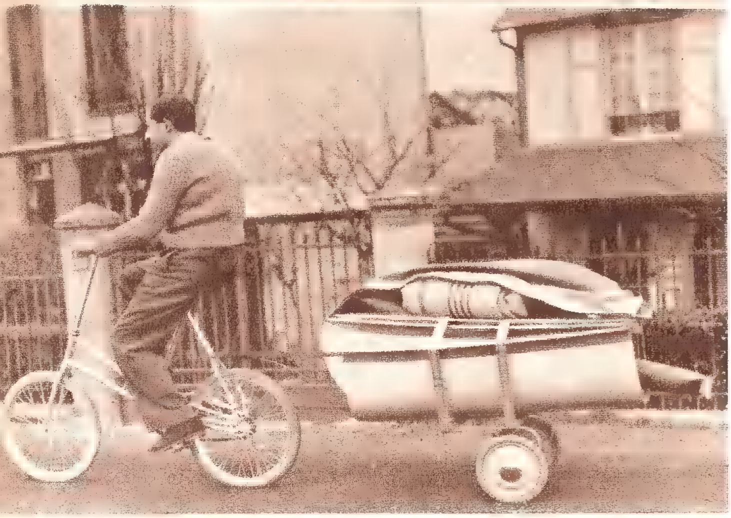
Danish Training Ship In Hudson

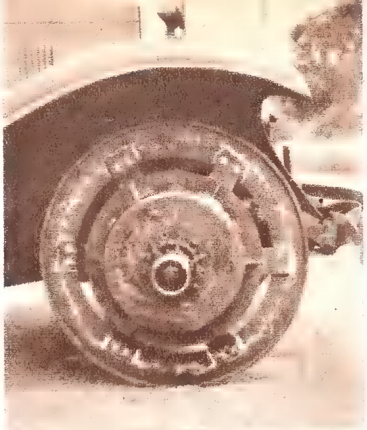
CARRYING 120 cadets, the Danish State Merchant Marine training ship *Danmark* sailed across the Atlantic to participate in Denmark's program at the New York World's Fair.

Canoe, Bicycle Are Collapsible

A COLLAPSIBLE canoe which can be towed on a trailer behind a bicycle which is also collapsible has been designed by a Frenchman.





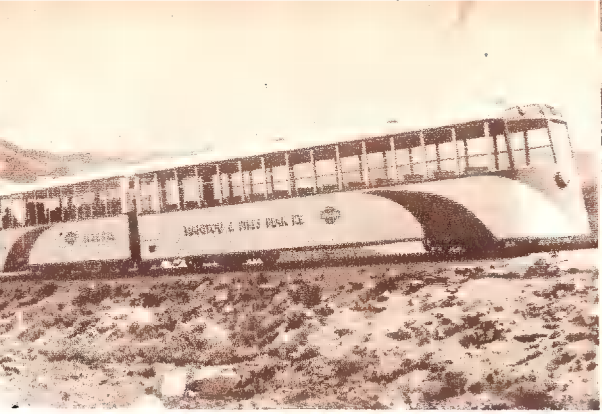


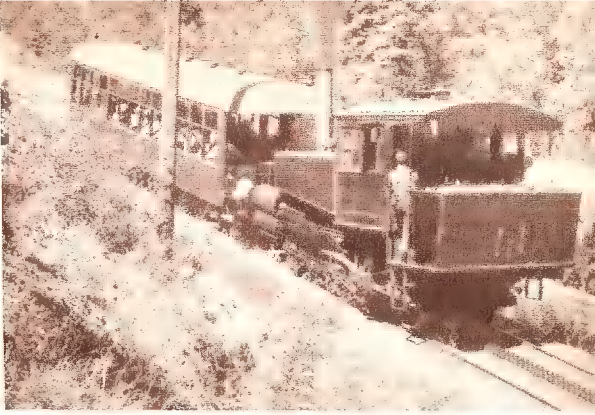
Tires Protected By Safety Wheel

A SAFETY auxiliary wheel made of steel to prevent blowout crashes and to protect punctured tires has been designed for automobiles by Charles "Cyclone" Urban of New York. The safety wheel is cushioned by a coating of hard rubber.

Braves Flames In Demonstration

A STRIKING demonstration of a new fireproof chemical was given by Jack Truro, British inventor, when, clad in an ordinary suit of overalls which had been treated with the solution, he rescued a dummy from a blazing airplane. The chemical will make any absorbent material fireproof.





Diesel Locomotive For Cog Railroad

THE first rack-rail diesel-electric locomotive has been built for the Manitou & Pike's Peak Railway, highest cog railroad in the world, and replaces the old style, tilted, steam locomotive in use for many years. It is powered by three diesel-electric generating units, each rated at 160 horsepower at 1,800 feet above sea level.

Daredevil Cyclist Goes Through Fire

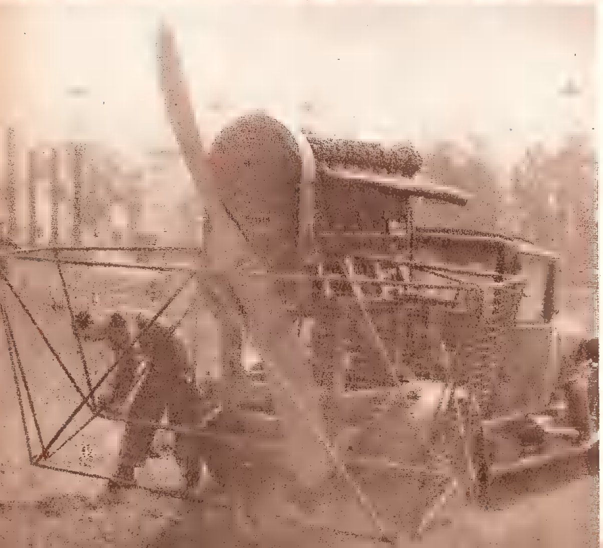
DEFYING a fiery death, Harry Woolman rode through a flaming hoop on his motorcycle to thrill 14,000 at the opening of a speedway in Washington, D. C.

Los Angeles River Still Yields Gold

THE California gold rush passed into history long ago, but a few prospectors are still earning a living by washing bits of the precious metal from the sands of the Los Angeles River in that city. Raw gold is rarely found, but bits of gold jewelry often find their way into the improvised sluice boxes. Findings are enough to make a buyer visit the river daily.

Fighting the TERROR of

Men race for their lives when the dreaded cry of "Gas!" is heard across the oil fields—but that's before the "Roughnecks" arrive and take over!



The first point of attack in capping a rampaging gas well is to produce an artificial fog. The "fogger" at the left reduces the danger of sudden oxidation.

AN OIL field basks quietly in the afternoon sun, almost deserted save for a crew drilling a new well—almost down, that well—and a few others who tend the drowsily chugging pump plants. A quiet job, a lonely one, extracting this black gold from the earth.

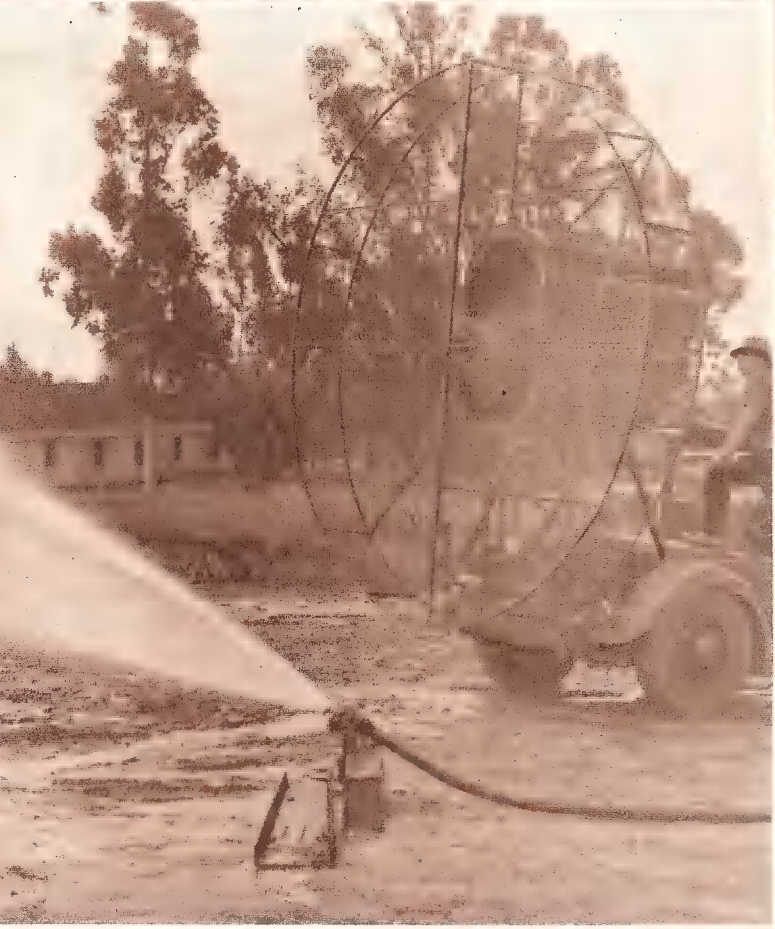
Suddenly there is a dull thud; scarcely more than would be made by a falling timber. Comes an ominous hissing . . . a cry . . . the most dreaded cry of the oil fields.

"Gas!"

Out of the new well, men pour like

the Oil Fields

by Marshall Perham

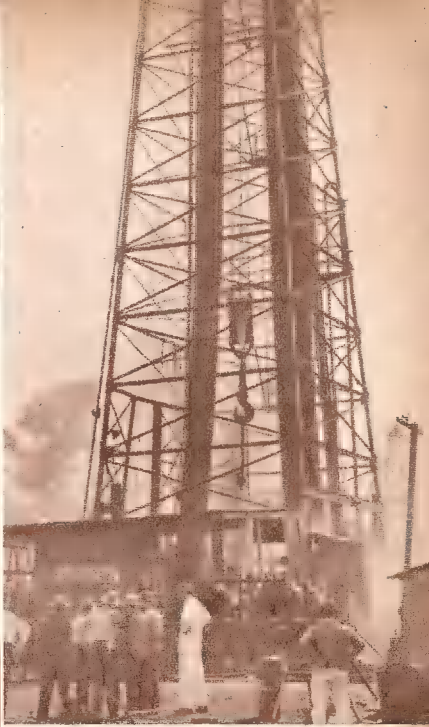


The "fogger" in action. With the prop going full blast, a two-inch hose runs a high pressure stream in front of the wind current, resulting in a fog.

frightened animals. They run for shelter, taking every direction, scattering in the terror of momentary death. All over the field, men seek shelter, while the hissing raises to a wail, a scream.

A terrible, anticipatory minute passes. Another. A man dares leave his shelter. He sprints across an open space, enters a metal building, jerks up a phone.

"Gas!" he calls hoarsely. "Gas, on number 48, at the thousand foot level . . . yes, running wild. Help, quick!"



With the "fogger" in operation, men dare to come right up to the well. Fumes are blown away by the current of air, and fog makes ignition virtually impossible, enabling cappers to go ahead with their vital work.

Before installing a valve, the men on top of the derrick check to see that all lines are free. Few insurance companies will issue life or accident policies to these "gas roughnecks."

Top: The crew unloads one section of the two-piece valve. Above: Final adjustments are made on the valve before its installation. If anything goes wrong from this point on, destruction of the derrick is a certainty.

Quietly, invisibly almost, the subtle, deadly vapor is creeping through the field. There is nothing spectacular in this; oil field tragedies are usually spectacular. Here is no endless, leaping column of flame that accompanies an oil well fire, no tearing down of a derrick, no murderous heat. But these men know that one bit of flint, whisked upward from the source of the well by escaping gas, may touch lightly on the steel pipe, and in one brief instant, there will be more wholesale death and destruction than could be wrought by a flamer in a month.

The great steel derrick, 130 feet high, will come down in a mass of twisted wreckage. Fragments, more swift and vicious than shrapnel, will be hurled to the remotest corner of the field, and beyond. For a fraction of a second, there will be a wind exceeding hurricane proportions, that will blow men down like toy soldiers, level their works as if they had constructed them of match sticks.

Word reaches a central switchboard, and all of man's scientific weapons swing into action to combat his slave turned Frankenstein. Within five minutes, via telephone and short wave, police cars have been notified, and all sur-

Right: Here it goes! This is the crucial moment as the valve is lifted into place. Steel will touch steel near the gas outlet, and one spark, generated by a careless move, will mean that many lives are in danger.

rounding roads are blockaded. Fire stations for miles around have turned out their crews and equipment to stand by, though none knows better than they that if the explosion comes, they will be no more useful than life-guards at a bursted dam.

The scream of escaping gas is deafening. Presently someone notices faint spots about his clothing. Oil workers look gravely at each other. The "blower" is laden with "crude"—that is, it has tapped the main oil reservoir, and if it should ignite, the whole oil field may go.

Minutes pass, each one fraught with danger. Then a strange device comes waddling up the road. Lines of anxiety relax from men's faces at the sight of it, for this odd creature, which looks like a wingless airplane mounted on a light delivery truck, will decrease the fire danger a hundred fold—not eliminate the danger, true, but decrease it mightily.

This is known as a wind machine in motion picture studios, and a "fogger" in the oil fields. It is, indeed, a wingless airplane, mounted on a truck; it is simply an airplane propeller and motor, the former screened off by a heavy wire guard, to prevent someone from walking into the flying blades.

These machines have long been used to produce effects of wind and rain for motion pictures. Recently, they have been used to cast an artificial fog over wild gas wells, and fires have been measurably decreased. A stream of water is run in front of the flying prop, and air currents set up produce a heavy fog over the well. Under such conditions, much of the combustible properties of the gas are absorbed immediately, so the possibility of explosion is reduced.

A few adjustments put the fogger in operation, and men dare venture closer. Many curiosity seekers mingle with the "roughnecks."

"What are you going to do now?" one of the former demands.

"Nothin'—for a while."

"But that thing's dangerous! It might explode. It's throwing oil all over houses, two miles away. Besides, that gas is worth money."

"Yep. Worth two or three hundred dollars an hour, mister. And the damage'll be a lot more. But we can't do nothin' with it. A flamer, and we'd be right at it. But an oil well's one thing, and a gas well's somethin' else. We just gotta wait until somebody gets here who knows what's what."

But the waiting is not long, for modern science moves fast to correct its errors. Sirens rise over the wail of the well, and two trucks appear, escorted by motorcycle police. One is heavily loaded with pipes and equipment. The other is full of men.

Strange creatures! They might well be

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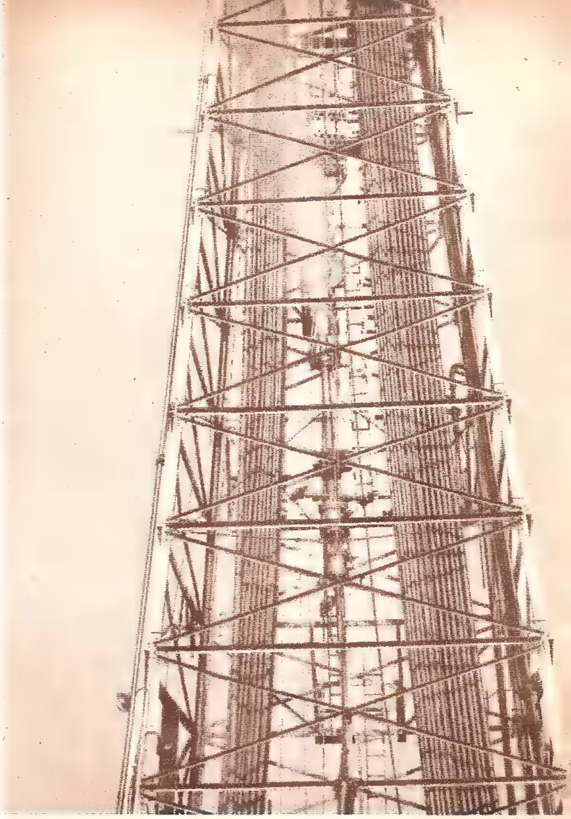
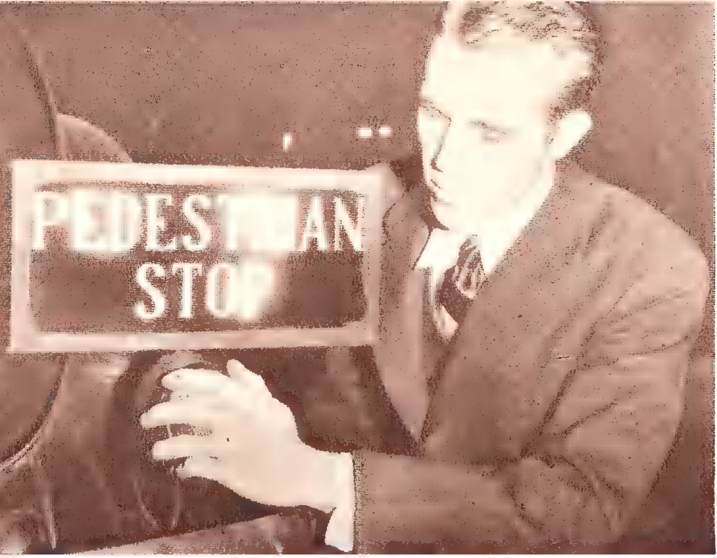
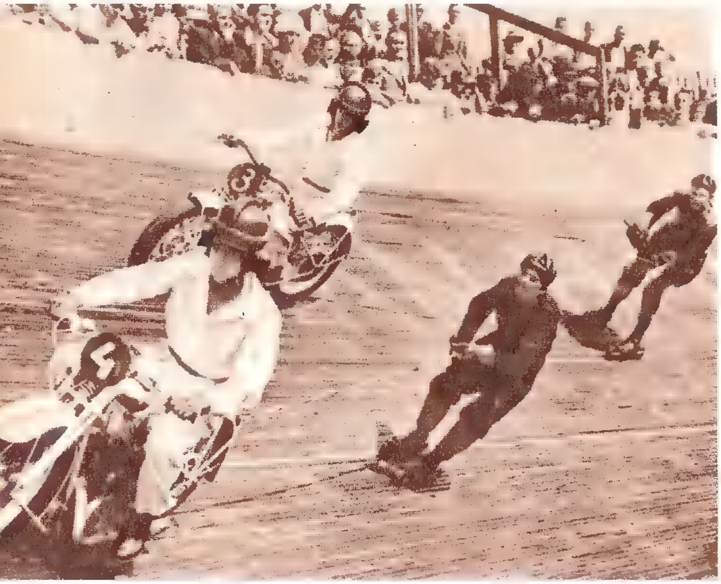


The valve is in place and all that remains is to interrupt the flow. Below: A gas "roughneck," his face smeared with grease and oil, looks over a day's job well done.



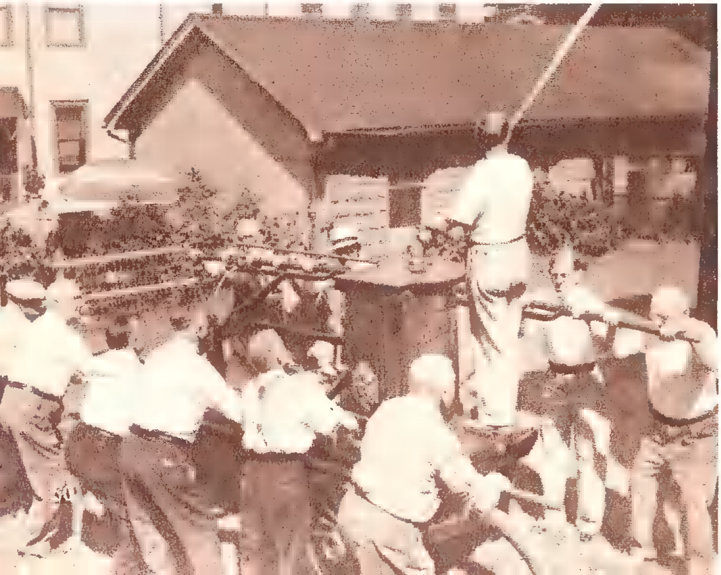
Sign On Automobile Aids Pedestrians

AN ELECTRIC sign to warn motorists behind him that he was stopping to let a pedestrian cross the street has been invented by William Green, Pasadena, Calif., mechanic. The light is operated by a button on the floor near the brake. Letters in the sign are not noticeable unless the light is lit.



Motorcycles Tow Roller Skaters

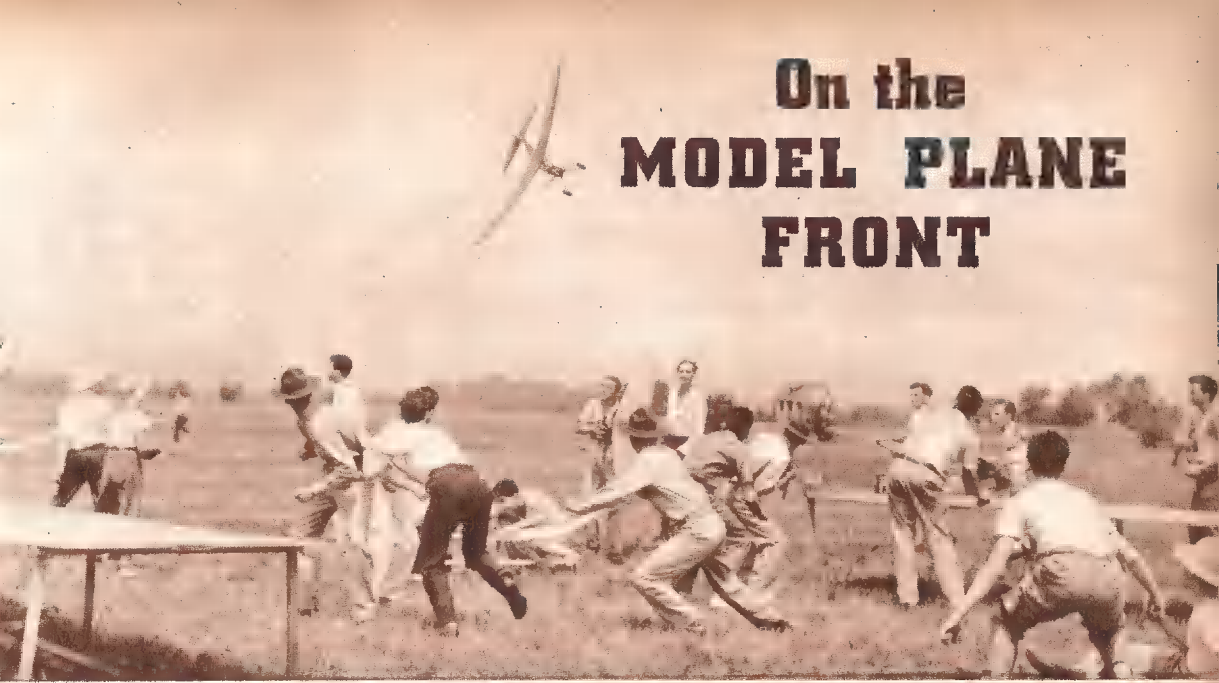
ROLLER skate-joring behind motorcycles, a sport inspired by ski-joring, is something new in The Netherlands. The skaters, wearing specially constructed skates with rubber wheels, are towed around the board track of the velodrome at a speed of approximately 35 miles an hour.

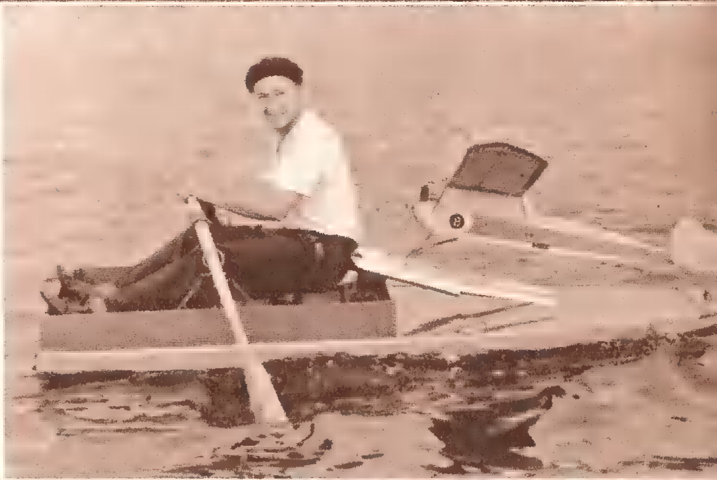


Old Fire Engine Still Effective

A FIRE engine 132 years old and claimed to be the oldest in the United States was demonstrated recently at College Point, Long Island, by a group of oldtimers.

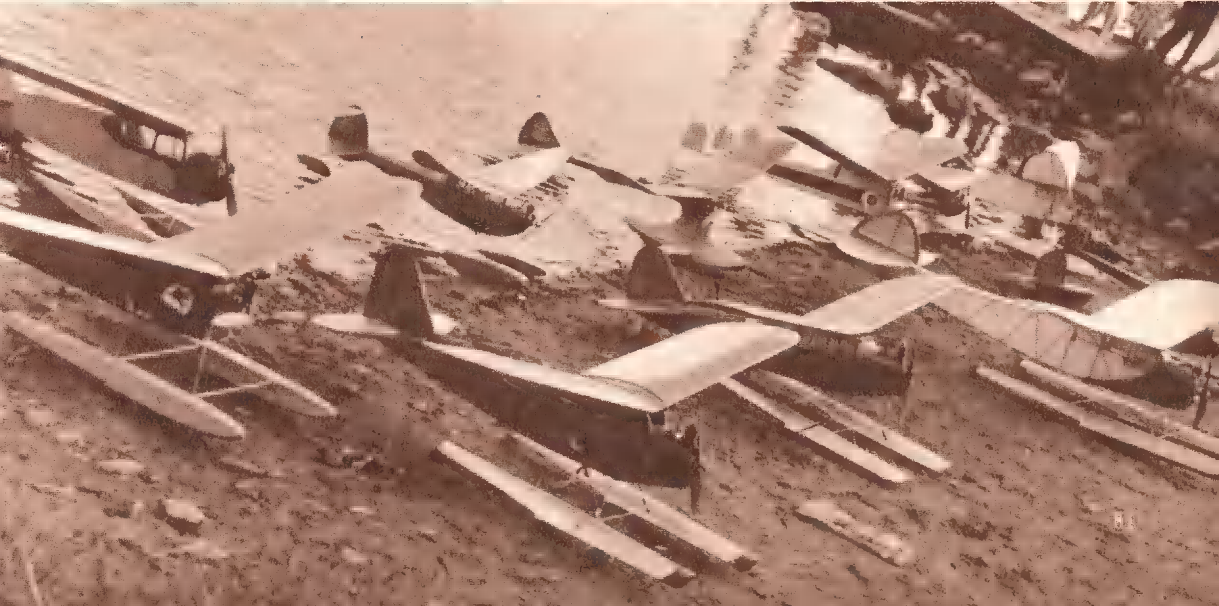
On the MODEL PLANE FRONT





ABOVE is an unusual scene photographed just before a crash at a recent gasoline model meet, when a plane suddenly got caught in a down draft and went into a dive. Timers and contestants got out of the way in the nick of time.

Seaplane meets are comparatively new model events. At right is Ed Mastrovich of Fords, N. J., and his seaplane carrier at the first eastern seaplane meet. Below are entries in the meet, drawn up on the shores of Lake Hopatcong, N. J., where it was held.



Ice Fishing

An airplane calls at a permanent fishing camp on a northern Canadian lake for a load of fresh caught fish.

Tractors like this haul sleds loaded with fish from frozen lake fishing grounds to the nearest railroad for shipment.

CANADA'S wheat growing prairies have entered into competition with her Atlantic and Pacific coast fisheries. They are now sending fish to all parts of the North American continent. The fisheries of the prairie provinces are becoming more important each year. Their output in recent years has averaged more than $4,000,000, and the fishing industry in the prairie provinces is not many years old.

Fish are now taking to the air, or rather are being taken by air to market. Fish caught in lakes in northern Saskatchewan, for instance, are flown twice daily to Prince Albert, a distance of at least 200 miles, and from there shipped by rail to Chicago, New York and other American and Canadian cities. Each plane carries about 1,600 pounds of fresh caught fish.

In addition to airplanes, tractor trains, consisting of tractors pulling sleighs and a caboose, haul in tons of fresh caught fish in the northern sections of the prairie provinces and northern On-

Hauling in a net of whitefish in northern Saskatchewan, where commercial fishermen dig through ice to net their catch.

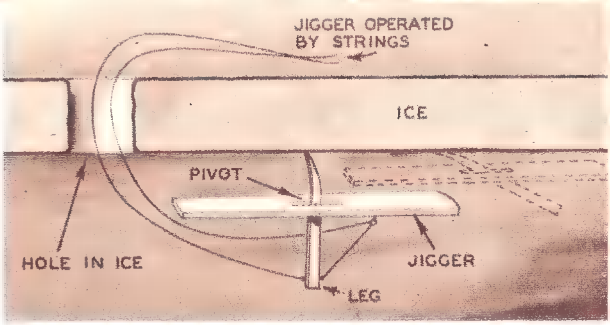
Grows in Canada

Hauling in a fish net on a frozen lake in Northern Ontario. Note the snowshoes of the fisherman.

tario. Few horses are now used to haul fish from fishing camps to rail points, but are used for local transports at some of the fishing camps.

Before the present commercial development of the fisheries of the prairies, fish supplied a constant larder for natives and whites of the northern parts of the Dominion. Indians, trappers, and hardy agriculturists who are making a go of farming in the northern sections of these provinces have all found that the fish from the northern lakes are not only large as compared to the same species caught in lakes farther south, but are also firmer of flesh and tastier. It is a well-known fact among fish men that the colder the water, the better the fish. And many of these inland lakes now being fished are north of the 53rd parallel of latitude.

The fishermen move to their northern fish camps late each autumn, before the freeze-up stops their travels. They make camp, sometimes requiring log cabins for some of the fishermen bring their families, and get all in readiness for the time when the ice is solid enough to stand the weight of tractors, sleighs and airplanes. Late in December, or early in January, they start fishing.



The "jigger" shown above illustrates how nets are placed under water. Pulling the strings causes the jigger to "walk" under the ice. When it has gone far enough it is located by its tapping noise, and a hole is dug and the jigger is removed. The cord attached so it is a continuous line from hole to hole, along which a net can be pulled under the ice.

A hole is dug in the ice and a net strung under the ice for a hundred yards to another hole in the ice through which the guide line is hauled up. Eight or ten of the nets are set out on the same line. This is repeated at various places on the lake ice, covering a good

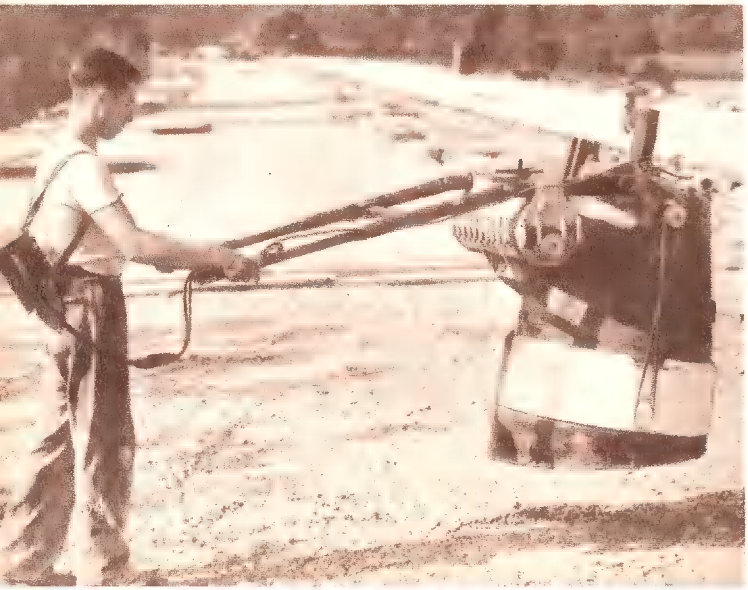
[*Continued on page* 126]

Violet Ray Lamps Kill Milk Germs

GERM-KILLING radiation from new short-wave ultra-violet lamps is the dairy industry's latest answer to the problem of sanitary milk-bottling and distribution. The photograph shows one of the installations employed in the new process. The hood-caps, upon leaving the forming machine, pass under the sterilizing rays. Thick sheets of lead-glass, which the rays cannot penetrate, protect the eyes of the operator.

Britain's Air Scouts Learn About Planes

BRITAIN'S first troop of "air scouts" has been formed in the Suffolk village of Kedington. The scouts wear the ordinary scout uniform except that their neckerchiefs are of Air Force blue. The lads are given a thorough training in aerodrome duties by Royal Air Force instructors and are then tested by officers. In the present national emergency it is believed they will be able to relieve regular R.A.F. men whose services might be needed elsewhere.

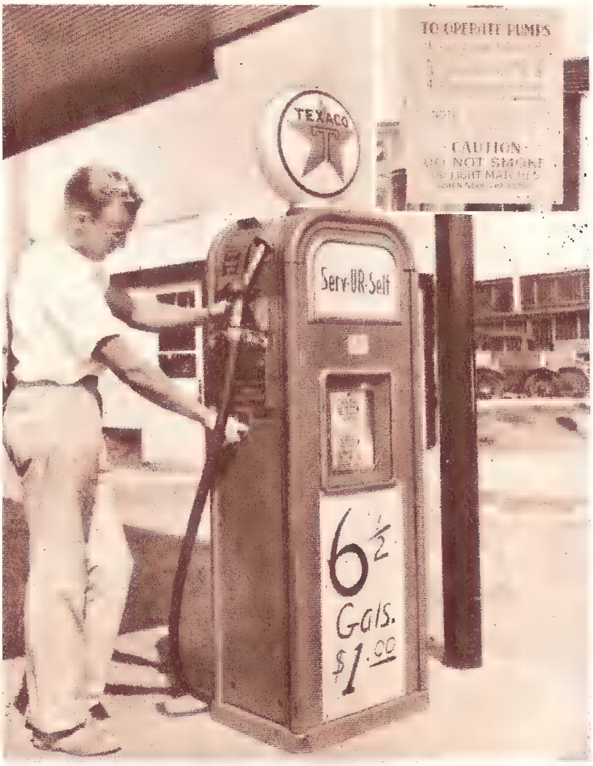


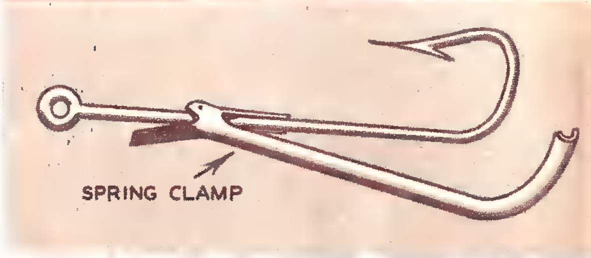
He Lifts Half a Ton With Little Effort

THE picture might lead you to believe that the young man was a direct descendant of Hercules, but such is not the case. The rammer which he is operating, although weighing half a ton, is so light to handle that it can be operated easily by one man. It is used to hammer down the loose gravel on new roads, and operating it is much like playing guardian to an overgrown jumping-jack.

Pump Your Own Gas

IF YOU'VE ever run out of gas late at night when gas stations were closed, you'll appreciate this latest wrinkle in gasoline dispensing—the "Gasoteria." The motorist drops coins into slots in the tank and may deliver gas directly into his car without the aid of an attendant. Should the tank be empty, his money is returned automatically.





Hook Won't Damage Bait

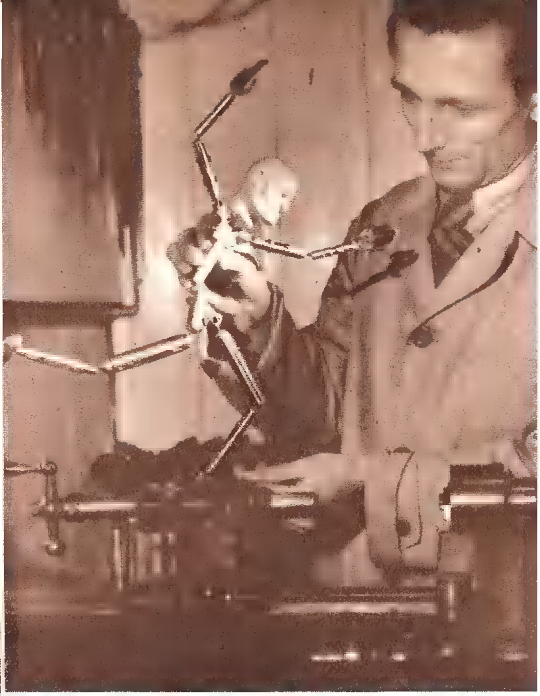
A BOON to fishermen is this hook which will not damage live bait, but will permit it to move about freely. It consists of a clamp, with the hook acting as one jaw, and is attached to the tail, or dorsal, fin of the fish.

Fertilizer Uses Air Pressure

WORKMEN in Westlake Park, Los Angeles, are shown using air pressure to deposit fertilizer in the ground. The man with the long drill makes a hole in the earth, into which the other man blows the compressed air and fertilizer. This method enables gardeners to fertilize the soil to a greater depth than heretofore.

DOLLS Become ACTORS

Actors who never exhibit flashes of temperament [illegible] shown as they appear backstage.



Skeletons of the doll actors have movable joints so their positions may be changed for each shot.

This scene from The Seven Ravens shows the angry father cursing his sons.

In this [illegible] the little girl learns she is the [illegible] of her brothers turning into ravens.

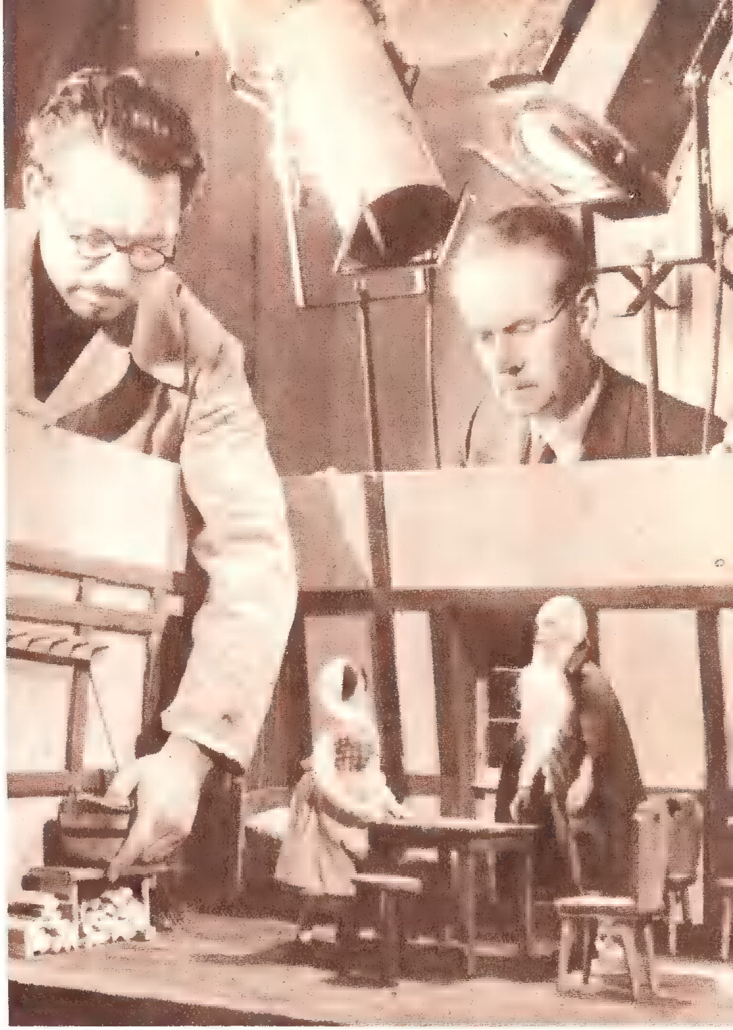
While seeking her brothers the girl falls asleep in the forest, where [illegible] prince finds her.

DOLLS may replace drawings as actors in animated cartoon movies if the idea developed by three Italian brothers proves successful. The present way of making such films, the best example of which is Walt Disney's Snow White And The Seven Dwarfs, is to shoot thousands of drawings separately and then piece them together so that the subjects appear to move when projected.

To remove the need for a drawing of each movement of a character, the brothers decided to use dolls in miniature settings. Filming procedure is the same but the cost is less. By this method they have taken Jakob Ludwig Karl Grimm's old fairy tale, The Seven Ravens, and turned it into an interesting movie.

In the picture, several scenes of which are shown in accompanying photos, the story tells of an old man who had seven sons but no daughters. At last a girl was born, but she was so small and delicate she had to be christened at home. Her brothers were sent for water to baptize their newborn sister, but in their hurry they dropped the jug. Whereupon their father

[*Continued on page* 127]

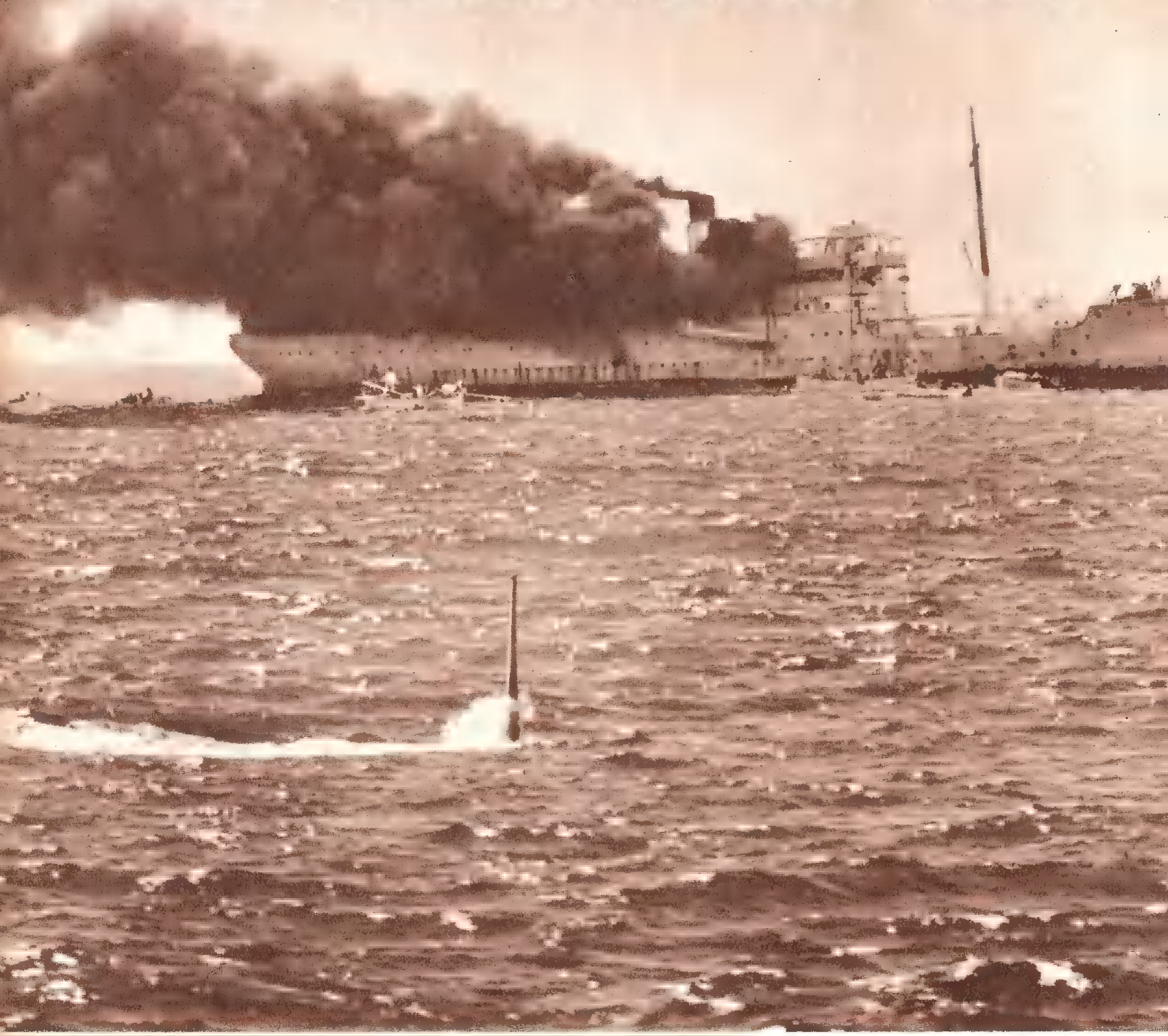


Man giants, the director and camera man, intrude on the miniature setting of the Toyland Theatre.

The princess is tried as a witch when her own sons suddenly turn into ravens.

The princess had previously taken care of an old blind man and his daughter. They demand her release.

Will Submarines Win



A "U-boat" strikes! At left are two destroyers, greyhounds of the sea, the submarine's greatest enemy.

by Cliff Taylor

NIGHT was falling as the British liner *Athenia,* Montreal bound, plowed steadily westward across the North Atlantic. Just nine hours before, Great Britain had declared war on Germany; three hours earlier France had followed England's lead.

At 7:45 p.m. a terrific

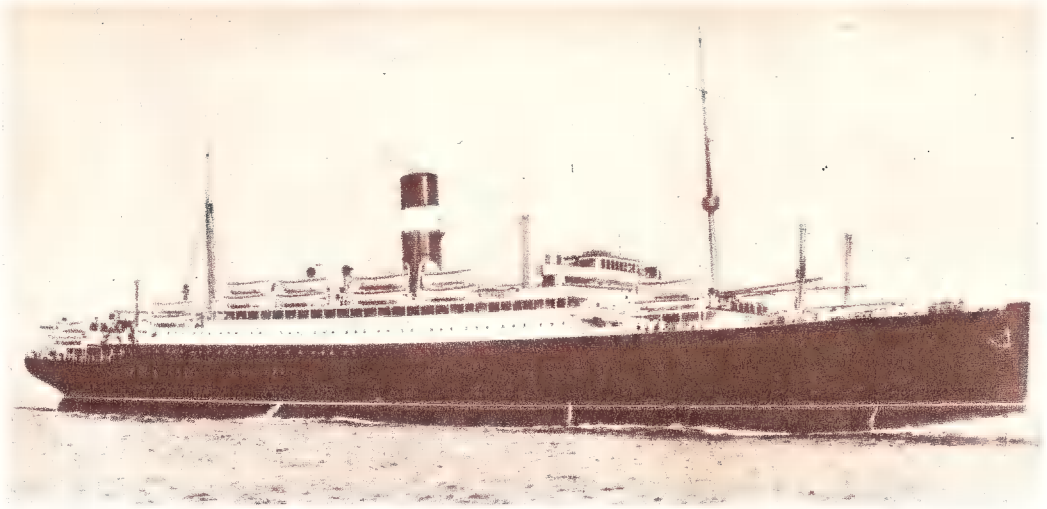
The War?

Submarines almost won the World War for Germany. Will the lessons Britain learned then enable her to spike the U-boat terror this time?

explosion rent the *Athenia's* side, sending terror into the hearts of the passengers and crew. A waterspout leaped high into the air, to fall back over the decks and lifeboats. Passengers were hurled over the ship rails into the sea. Water surged into the engine and boiler rooms.

Far off across the waters some of the passengers saw the grim outline of a submarine. Its gun, they said, fired a single shot at the mainmast before vanishing into the night. The sea around the mortally wounded *Athenia* filled with lifeboats, swimmers, and wreckage. Around midnight the *Knute Nelson*, a Norwegian freighter, arrived, followed shortly by the yacht, the *Southern Cross*. Early the next

Right: A British warship drops depth-bombs. Below: *H. M. S. Courageous*, British aircraft carrier, which was sunk by a German U-boat with a loss of almost 600 men.



The ill-fated British liner *Athenia,* which was sunk off the Irish coast by an unidentified submarine.

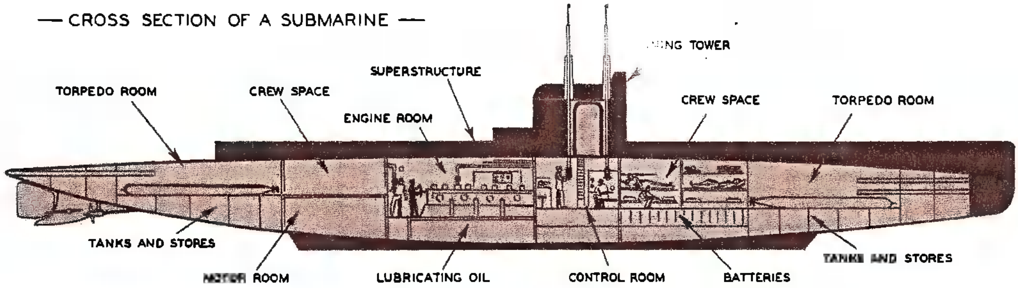
Forty-two merchant ships of all nations, with a total tonnage of 184,909, had been sunk by torpedoes, mines, or shell-fire in the first twenty-one days of the current war. The losses in the comparable period of February 1-21, 1917, were 139 vessels with a tonnage of 347,418.

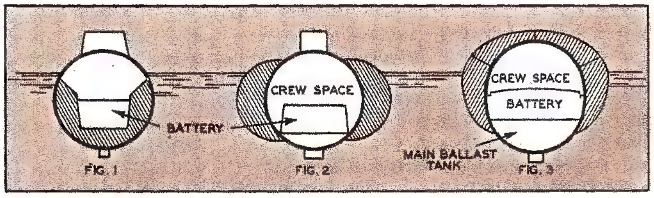
Comparison, Present War and World War

Registry	Ships Sunk Sept. 3-23, 1939	Ships Sunk Feb. 1-21, 1917
British	30	87
Other belligerents	1	12
German	4	0
American	0	2
Other neutrals	7	38
Totals	42	139

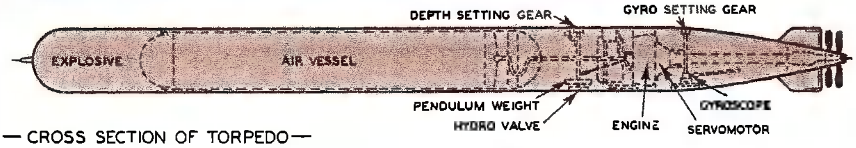
morning, the *Athenia* rose on her bow in a last convulsive throe, and then plunged stern-first to the bottom of the sea, the first victim to fall prey to submarine in the present war.

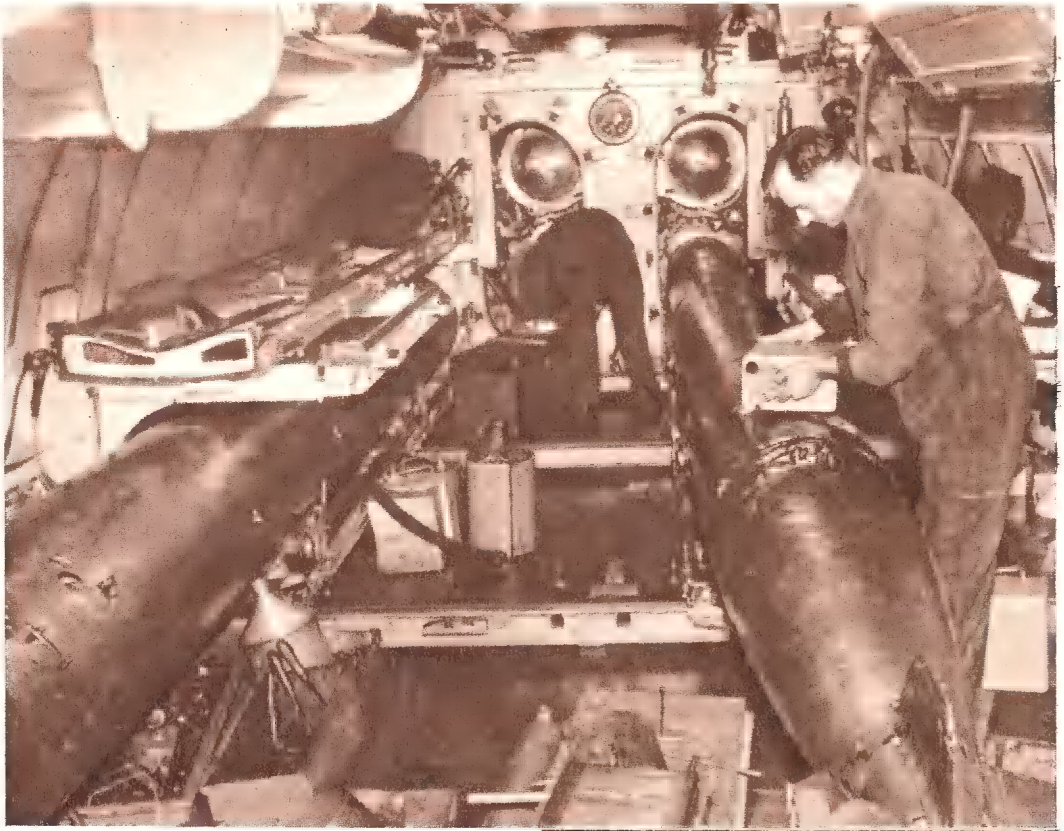
Within the next 21 days, forty-two merchant ships of all nations, with a total tonnage of 184,909, had been sunk by torpedoes, mines, and shell fire, and the world found itself wondering just how big a part submarines would


— CROSS SECTION OF A SUBMARINE —
CONNING TOWER
SUPERSTRUCTURE
TORPEDO ROOM
CREW SPACE
ENGINE ROOM
CREW SPACE
TORPEDO ROOM
TANKS AND STORES
MOTOR ROOM
LUBRICATING OIL
CONTROL ROOM
BATTERIES
TANKS AND STORES


BATTERY
FIG. 1
CREW SPACE
FIG. 2
CREW SPACE
BATTERY
MAIN BALLAST TANK
FIG. 3

Above: The interior of a submarine of medium displacement. Left: Cross-section views of three types of submarines. Below is a torpedo; its nose contains a high explosive. Behind the nose is a section of compressed air. When the torpedo is fired, the air shoots back into a section containing alcohol and water, generating steam used in the turbine to turn the torpedo's propellers.


DEPTH SETTING GEAR
GYRO SETTING GEAR
EXPLOSIVE
AIR VESSEL
PENDULUM WEIGHT
HYDRO VALVE
ENGINE
GYROSCOPE
SERVOMOTOR
— CROSS SECTION OF TORPEDO —



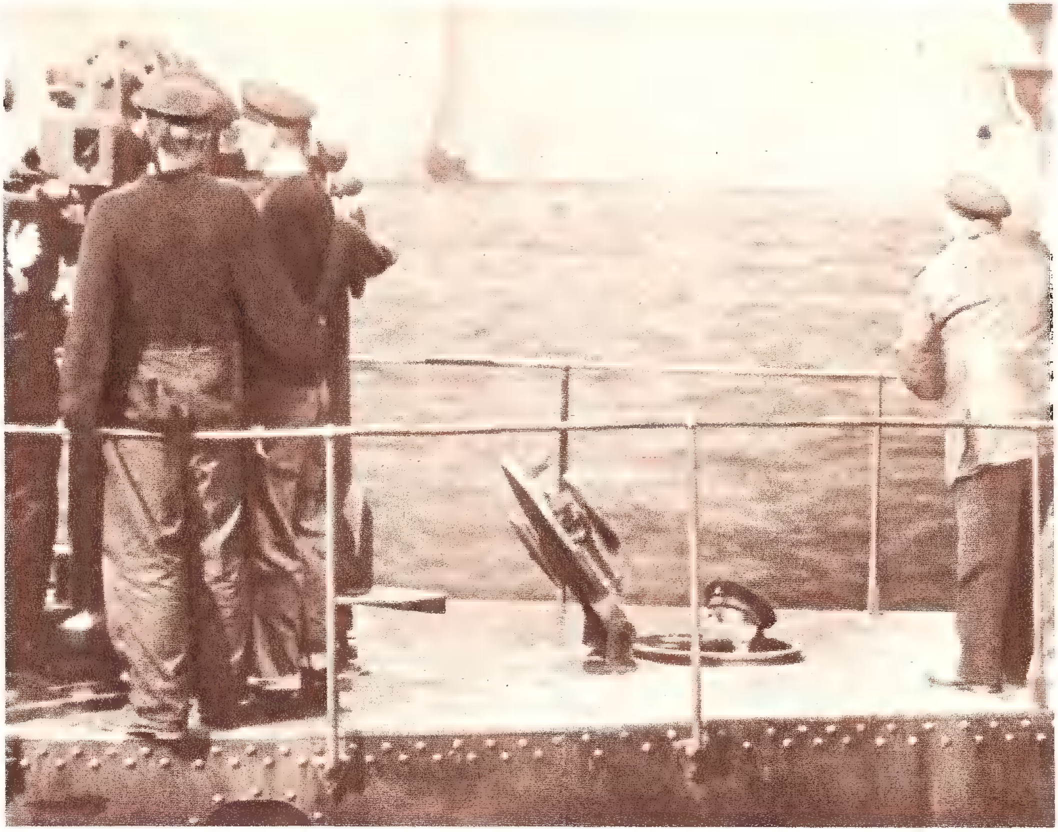
Interior of a torpedo room. Torpedoes are fired by the captain from the control room. He releases a charge of compressed air into the tube, ejecting the torpedo. As it slides out, a catch trips a trigger on the torpedo, starting the turbine and propellers.

An interior view of a submarine showing the crowded condition under which the crew must operate the craft.

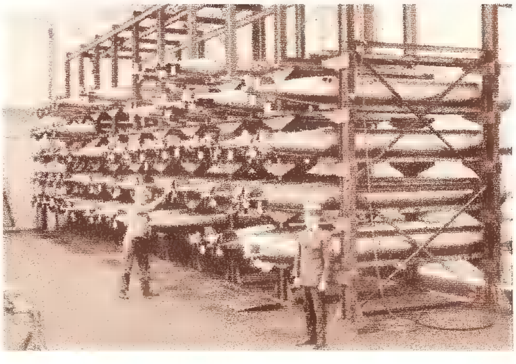
play in this war. Would German submarines prove the scourge of the seas as they did through the dread spring of 1917, when German U-boat were sinking vessels at the rate of one every four and a half hours? Would they prove to be a decisive factor in a war which bids to out-horror in every conceivable way the last one? Or has naval science found ways to combat the terrors of the underwater torpedo carriers that will nullify their danger to surface shipping?

In 1914, at the outbreak of the last war, neither the Germans nor the Allies realized what a potentially powerful arm of battle the submarine was. The Germans kept their fleet of 28 U-boats close to home in the North Sea, using them timidly and intermittently as scouts. In September of 1914, the U-9 sank three British cruisers in an hour, and from that hour on, both Germany and the Allies realized what the submarine could mean. The British Grand Fleet withdrew from its base at Scapa Flow to a safer harbor in Scotland.

In 1915, commerce raiding began in earnest, and in 1917 the German High Command started its greatest campaign of unrestricted submarine warfare, which reached its climax in April of that year. During that month one out of every four ships which left the British Isles went to the bottom of the sea; almost 900,000 tons of shipping were sunk!



A U-Boat crew aims its deck gun at a fishing boat. Below: Whitehead torpedoes stored in a U. S. World War submarine base. Today's torpedoes are larger.



The situation was so bad that Admiral Jellicoe wrote to the prime minister to tell him that the loss of shipping alone might force the Allies to conclude peace. If the Germans had kept up their furious destruction, they would have probably starved Britain into surrender!

Not realizing how close to success they were, they relaxed their campaign, while the Allies suddenly improved their anti-submarine defenses, and adopted the convoy system. The latter worked—the German submarine menace diminished steadily until the end of the war. But over the total wartime period, submarines had sunk 11,189,000 tons, over half of it British!

Can Germany's submarines repeat their successes in the last war? Or have the Allies, namely the British, perfected enough undersea defensive measures to nullify the terror of the dreaded U-boats?

First, let's look at the submarine. Today's submarine is a far more effective and efficient mechanism than was its predecessor of the World War. The typical German U-boat is roughly 180 feet long and displaces around 500 tons, a great deal smaller than the submarines of other nations. Its crew numbers between twenty and thirty men. The main purpose of a submarine is to fire torpedoes, those deadly "fish" of the wartime deep, and today's subs can carry more effective torpedoes in greater number than was dreamed of in the last war. During the last War, the submarine had to be aimed at the target in order to direct the torpedo. Today, gyroscopic controls inside the torpedo make it possible to curve its path.

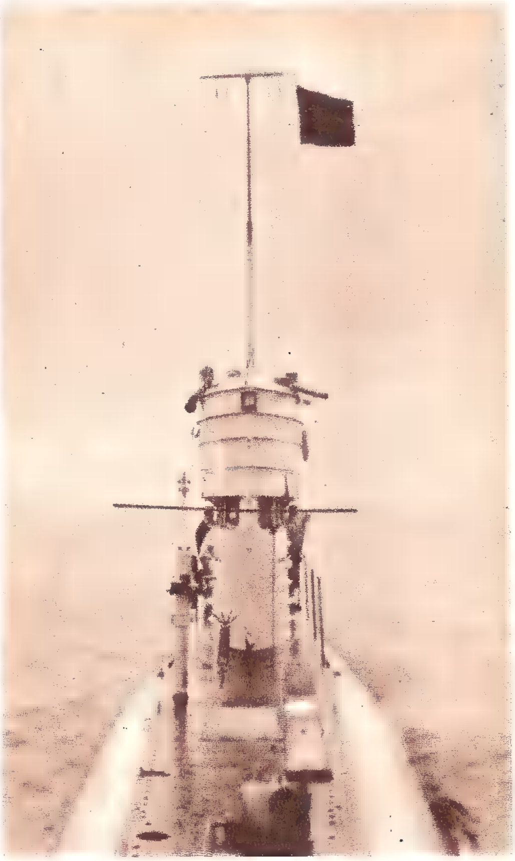
A torpedo weighs around 2,000 pounds, costs roughly in the vicinity of $8,000 and can travel as fast as 45 knots, or a little better than 50 m.p.h. A torpedo differs from other projectiles in that it is self-propelled. An initial impulse of compressed air shoots the torpedo from the tube, but once out of the tube it is moved along by the two propellers in its tail. Today there are torpedoes which have delicate sound detecting apparatus which will guide them to the vibration of any ship's engine in the vicinity, as well as torpedoes equipped with light sensitive arrangements which cause them to rise from under water when they enter the shadow the ship throws, thus striking the ship.

Just how effective the modern torpedo is has been driven home by the sinking of the British aircraft carrier *Courageous.* Two torpedoes ripped through the steel protective "blisters" around the hull of the 22,500-ton warship like knives cutting through cheese, and the ship sank, with 578 of her personnel drowned. And this with destroyers grouped around the *Courageous* to screen her from attack!

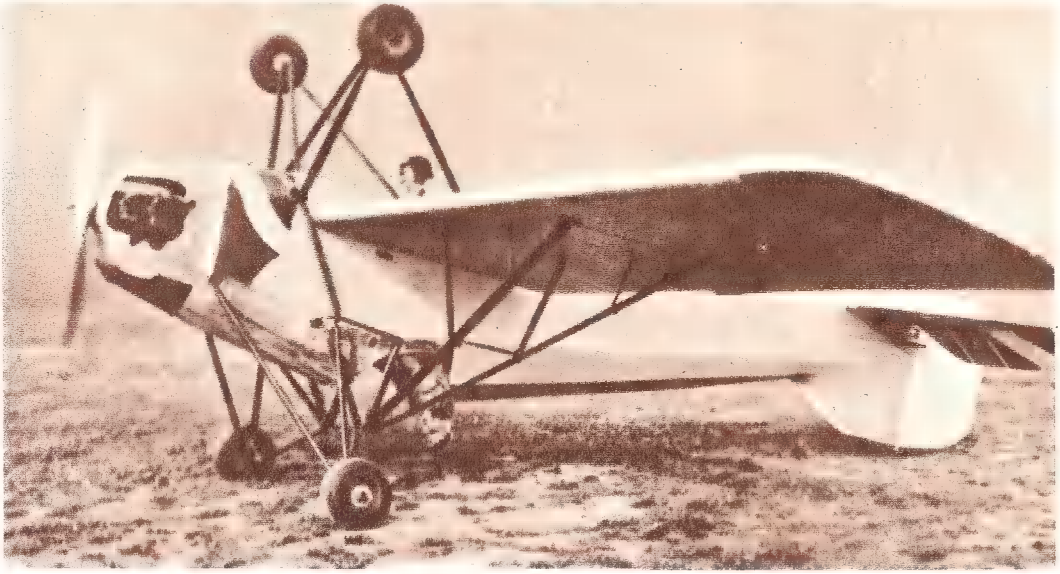
No one knows exactly how many submarines Germany has, although the guess is between 60 and 70 with anywhere from 20 to 60 being built. One thing is certain—there are enough to do plenty of damage!

A modern submarine has a cruising range of

[*Continued on page* 128]

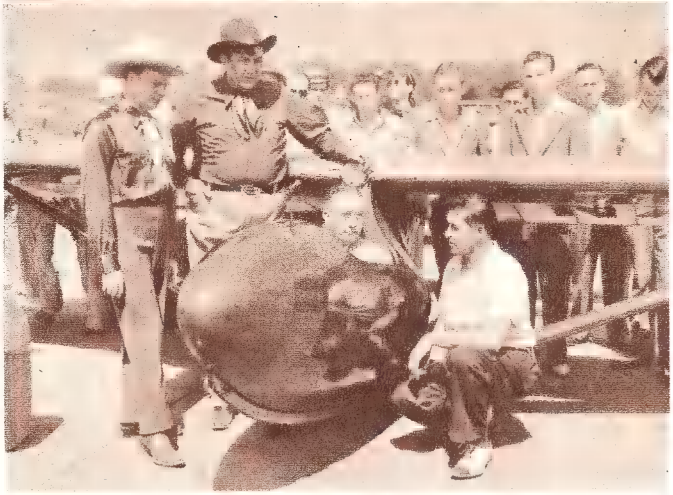


A deck view looking aft aboard a U. S. wartime sub. Below: An American submarine tender with "babies."



Plane Can Land Upside-Down

AN UPSIDE-DOWN plane has been designed and built by Michael Murphy, stunt flyer, and Eddie Leach. It is equipped with landing gears on top and bottom.



Baseball Dwarfed By Giant Apple

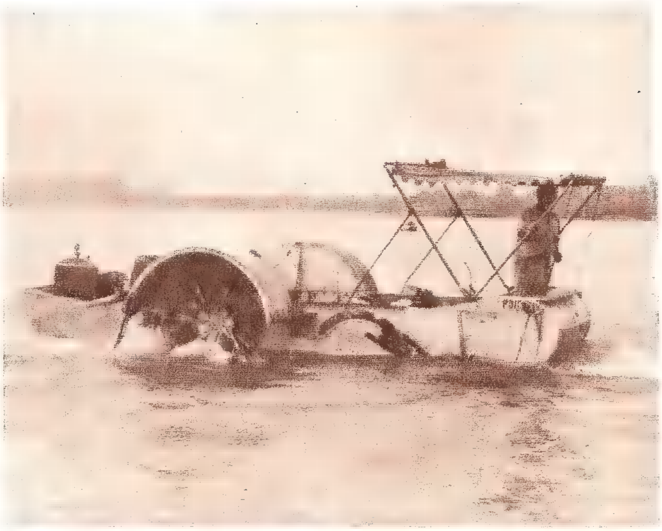
MISS GLORIA DAILY of Santa Cruz, Calif., holds a two-pound six-ounce Astrakan apple to show how it compares in size with a league baseball.

Glider Launched By Horse Power

EDGAR BERGEN, Charlie McCarthy's boss, demonstrates a novel method of launching a glider by towing it behind his horse.

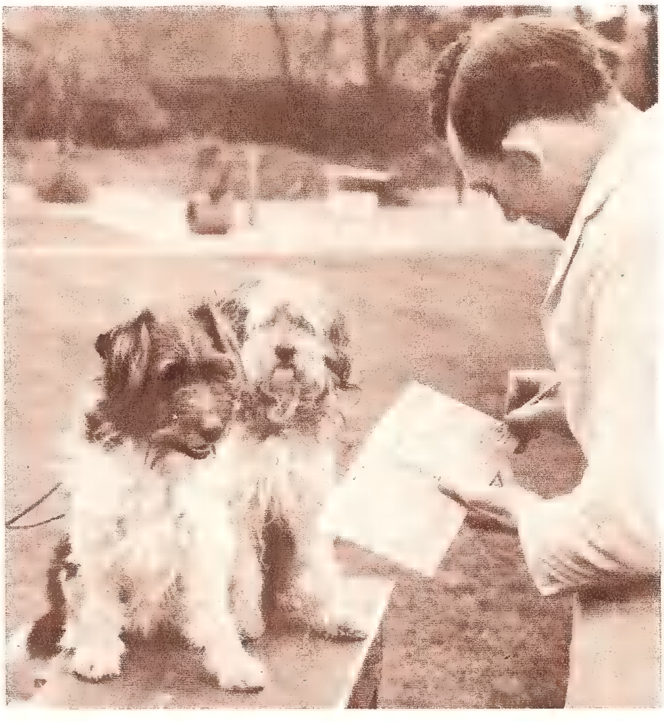
Weed Cutter Clears River For Race

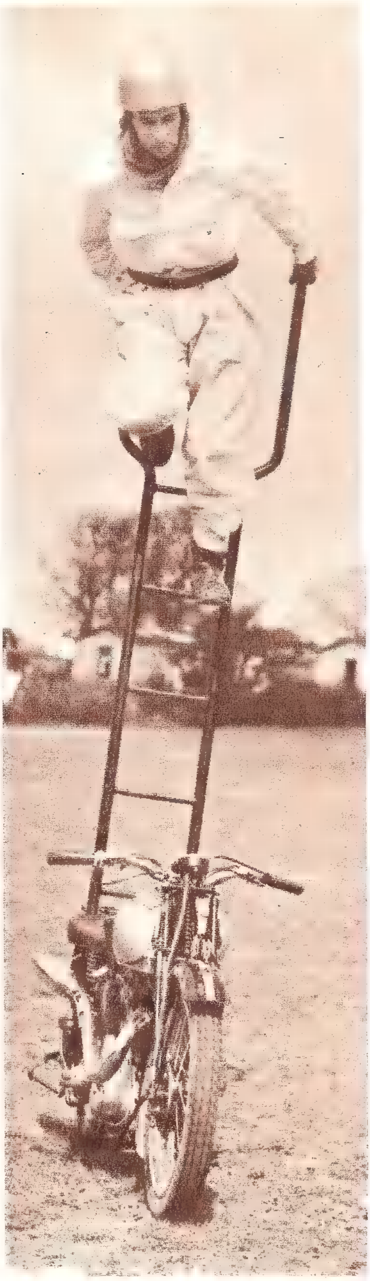
SO THAT speedboats competing in this year's Gold Cup races on the Detroit River would not become entangled in the weeds, a weed cutter went into action before the event



Identification Cards For Dogs

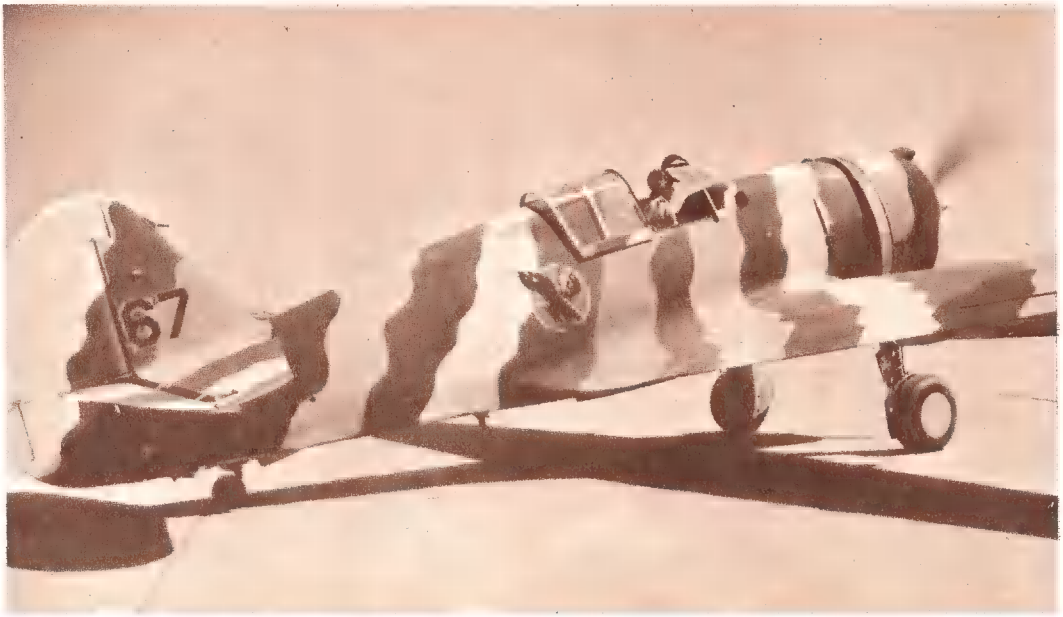
A SPECIAL wallet containing a dog identification card, license, pedigree and photograph is the latest method of helping the dog owner to avoid loss of his pet.

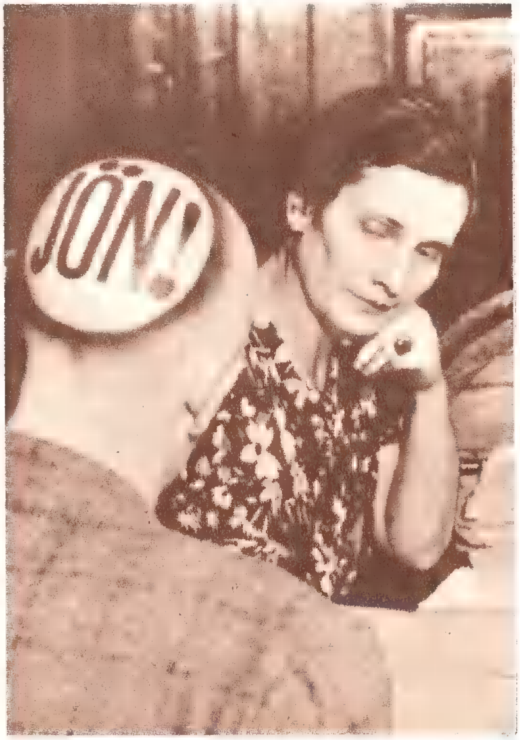




Daring Cyclist Rides On Ladder

A DAREDEVIL motorcycle dispatch rider of the British army covers the ground at a speed of 30 miles an hour while balancing precariously on top of a ladder mounted on his cycle.



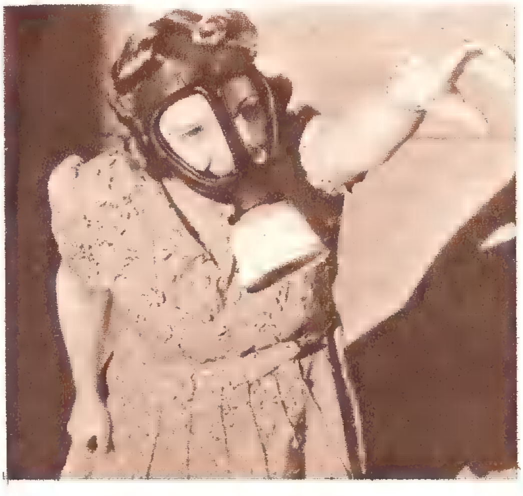


Plane Tests Camouflage

A COMBAT plane of the army's famous 27th pursuit group, all dolled up in its gaudy new camouflage, made a special flight to Chicago from its home base at Selfridge Field, Michigan. No reason was given for the flight, but observers believed that it was to test the plane's camouflage in the air.

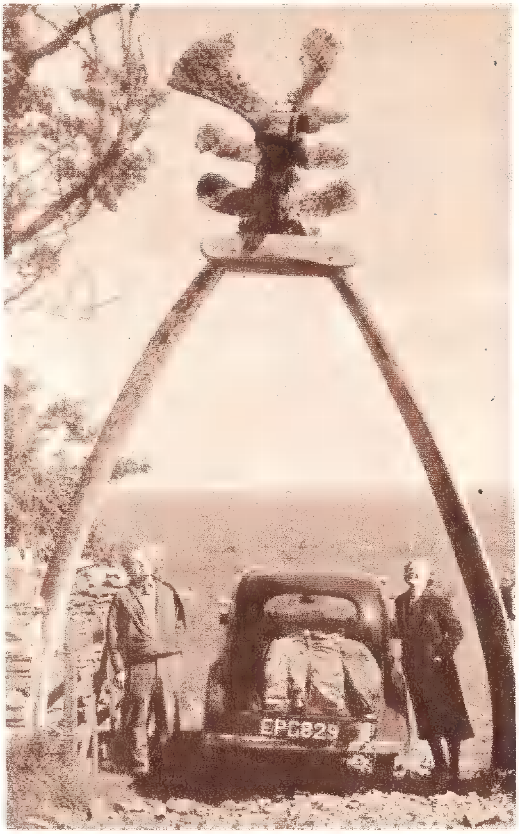
Full-Vision Gas Mask

THE young lady below is demonstrating one of the newest types of gas masks, now being produced in the United States. It allows the wearer full vision.



Human Billboard

AN UNEMPLOYED Budapest bank clerk, sadly in need of funds, hit upon the idea of using his head for advertising purposes. Shaving the back of his head bare, he rented the space for ads.



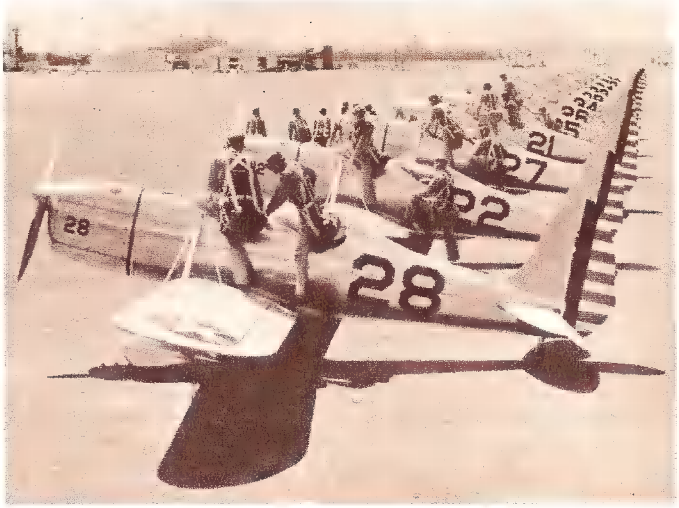
Portable Folding Cot

NO LONGER need people shy at week-end invitations because they fear inadequate sleeping accommodations. This new, compact folding cot, weighing but 15 pounds, insures them against make-shift beds.

Whalebone Gateway

A WHALE which was washed ashore some years ago is responsible for this unique gateway, which attracts many tourists in England. The arch is made from the ribs of the whale and is surmounted by tail bones.

Monoplanes Used For Army Training



FOR the first time in the 30-year history of Army aviation, monoplanes are being used for the primary training of flying cadets. Heretofore, biplanes have been used exclusively. The low-wing planes shown here are military versions of the Ryan YPT-16, and are being used for training cadets of the Air Corps Training detachment at the Ryan school in San Diego. Army air men like the idea of training pilots to fly in typical war planes.

Lighting The

Do you know what can be done with light to make your home a pleasanter place to live in? If not, read this article and get a few tips on how the modern home may be lighted.

From the inside looking out—you can see the callers but they can only view themselves. Right: Outside the door.

The efficiency of the living room fireplace is multiplied at least four times by a polished aluminum reflector placed behind the grate.

by Walter E. Burton

WHEN an engineer builds a house for himself, you can expect a few things out of the ordinary; but when the engineer happens to be a lighting specialist, you naturally would look for some unusual ideas in the harnessing of light. You would not be disappointed in the new home of G. F. Prideaux, who spends his working hours at the Nela Park laboratories of the General Electric Company, working on applications of miniature lamps. In addition to harnessing light for conventional uses, Prideaux has gone further and done some tricks with heat waves, which are just another form of radiation.

When you approach the entrance to his home at 1080 Allston Rd., Cleveland Heights, Ohio, you notice that it is not an ordinary entrance. Above the door is a box-like canopy made of translucent plastic material in the form of laminated sheets. A 3-watt "night light" burns inside the hollow canopy day and night, but is usually noticeable only after dark, when it produces enough illumination to make the cut-out metal house numerals stand out prominently, to illuminate the steps, and make the keyhole easy to find. When more illumination is desired, three lumiline lamps inside the canopy can be switched on.

As you are about to press the button that sounds the door chime, you notice that the

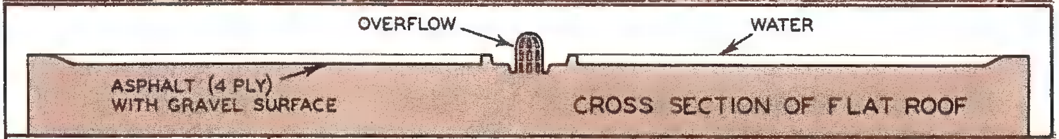
Ultra-Modern Home

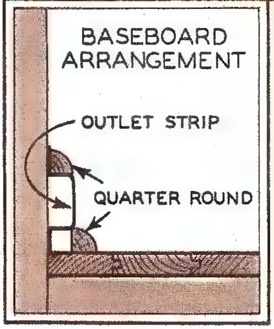
The outside of G. F. Prideaux's house at night, showing the lighted entrance canopy made of translucent plastic material and the corner grouping of the windows for best lighting and ventilation, as well as beauty.

door has a circular mirror in it, instead of a conventional piece of clear glass. This mirror is convenient for women callers who desire a last-minute check on their makeup; but for what other reason should an outside door have a mirror facing outward? The answer is obvious once you are inside, for this is not an ordinary mirror but a transparent one. That is, anyone inside the house can look through the mirror and see who is calling, but the caller, who might be a questionable character, can see nothing but his own reflection in the mirror.

It is not even necessary for an occupant of the house to go to the door when a caller rings, thanks to a private "public address" system. Above the doorway, concealed behind the plastic sheets of the canopy, is a loudspeaker-microphone unit that has a pickup and broadcast range of several feet. Located at convenient points in the house, such as the laundry and master bedroom, are similar units. A central amplifier unit, containing also a speaker and microphone, and resembling a table-top radio, is located in the kitchen. All the messages between points in the system pass through this amplifier, over a network of wires installed when the house was being built.

There is an attractive fireplace in the living room, but careful inspection reveals something out of the ordinary: Behind the grate is a large sheet of polished aluminum known to the trade as lighting sheet. It covers practically all of the area behind the fire, and is curved outward slightly at the sides. This sheet is one example of how Prideaux has harnessed heat rays, for its purpose is to increase the fireplace efficiency by throwing into the room radiant heat that otherwise would be absorbed by the bricks. Measurements made by him show that the heat output


OVERFLOW
WATER
ASPHALT (4 PLY) WITH GRAVEL SURFACE
CROSS SECTION OF FLAT ROOF



Above: The water conditioned roof, and a diagram showing how it is built to allow for the proper drainage.

Right: Plug-in outlet strip does away with long light cordage. **Left:** A diagram of the baseboard arrangement.

of the fireplace is increased about four times by the reflector. In fact, so efficient is it that it sometimes becomes an uncomfortable matter to approach close enough to stir the fire. When care is used in firing, the aluminum need be cleaned but twice a year.

End tables flanking the davenport are provided with lamps designed specially to minimize glare. Prideaux obtained a pair of stock lamps having diffusing bowls, and replaced the bowls with refracting glass bowls, which allow more light to pass downward. Then, to prevent upward glare, he covered the shades with discs made of the same sheet plastic material used for the front door canopy.

The dining room ceiling fixture makes still further use of this sheet plastic. It was built around a large spun-brass ring, which originally was part of another lighting fixture. Prideaux mounted this ring a short distance below the ceiling, covered the bottom with a disc of the plastic, and installed lamp sockets. Diffused light reaches the table directly through the plastic, and indirectly by reflection from the ceiling.

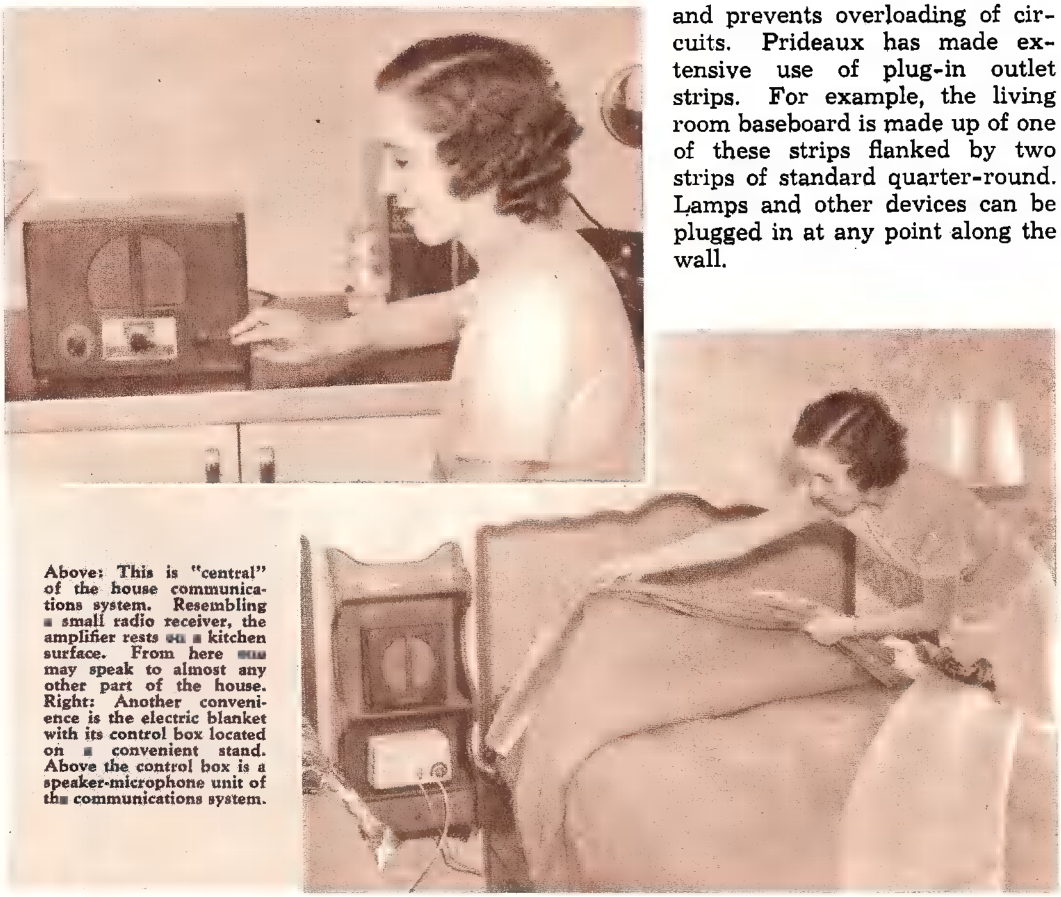
In the kitchen, a novel installation of a lumiline lamp was made. It is mounted on an outlet strip that runs across the window opening between glass and shade, and is fitted with a small aluminum reflector. The shade can be raised or lowered without interfering with the lamp; and a novel lighting effect results from having the lamp outside the shade when it is drawn. Colorful oiled-silk curtains over the shade add to the effect.

In the basement, general illumination of the recreation room is provided by 100-watt silver-bowl lamps installed in 10-in. aluminum reflectors recessed into the plywood ceiling. Although the reflectors are of a type used in sun-lamps, 25-cent aluminum mixing bowls, which are almost exactly the same shape and size, could be used just as well. The ping-pong table is illuminated by a row of lumiline lamps equipped with aluminum reflectors, together with two 100-watt silver-bowl lamps of conventional shape, placed at the ends of the lumiline string and protected by small plastic shades. A home-workshop bench on which are mounted a circular saw, lathe and other tools is lighted by several inside-frosted lamps mounted inside an open-bottom box painted white.

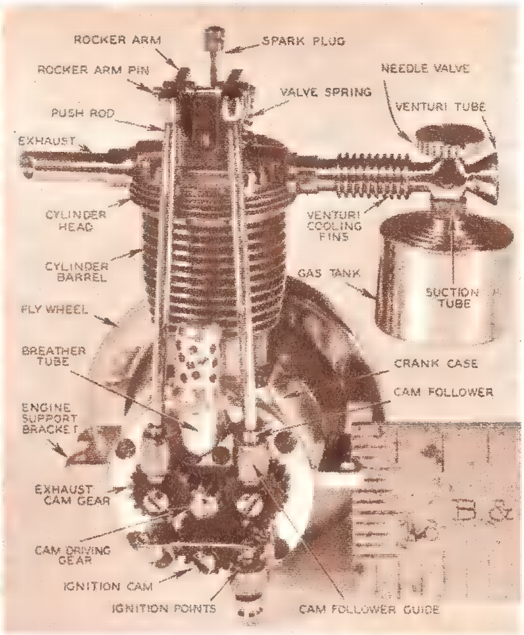
In designing the house, Prideaux gave much attention to placement of windows for best lighting and ventilation without interfering with furniture arrangement. The modern design of the house made corner grouping of the windows easy. Steel casement sash are used. They open to the outside to catch air, and are fitted with inside interchangeable storm glass and screens. The storm windows help maintain the efficiency of the air-conditioning system in winter.

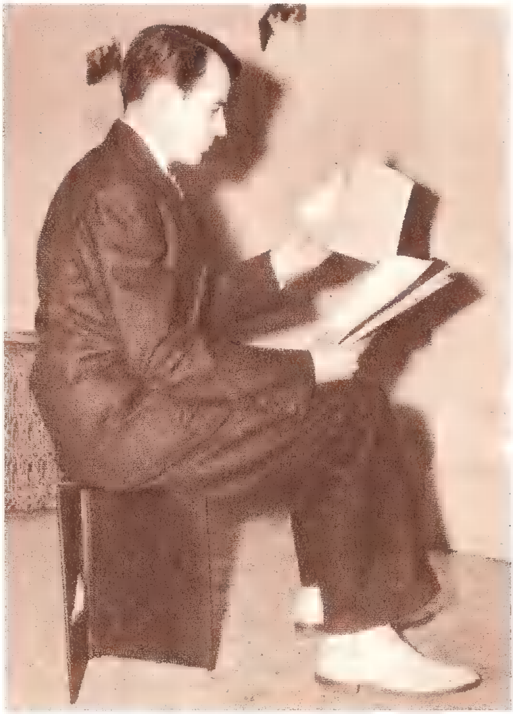
Further aid is given to the conditioning system by a novel roof arrangement. The roof is practically flat, and is covered with 4-ply asphalt topped with gravel. The eaves and center drain are designed to hold water on the roof, about an inch of it at the maximum. This water blanket serves two purposes: it traps the radiant heat from the sun and prevents it from reaching the house; and it further cools the roof by evaporation.

Electrical conveniences other than those mentioned include an electric blanket whose heat is controlled by a variable transformer unit; Christmas-tree lighting outlets on the outside of the house, for supplying current to strings of lights on evergreens in the yard, and to other decorative lighting devices; infra-red lamps for bedrooms, and a special floor-type reading lamp for use when reading in bed. The house has the latest type of radial wiring system, which assures adequate power at any point, provides convenient distribution control units, and prevents overloading of circuits. Prideaux has made extensive use of plug-in outlet strips. For example, the living room baseboard is made up of one of these strips flanked by two strips of standard quarter-round. Lamps and other devices can be plugged in at any point along the wall.



Above: This is "central" of the house communications system. Resembling a small radio receiver, the amplifier rests on a kitchen surface. From here one may speak to almost any other part of the house. Right: Another convenience is the electric blanket with its control box located on a convenient stand. Above the control box is a speaker-microphone unit of the communications system.


ROCKER ARM
SPARK PLUG
ROCKER ARM PIN
NEEDLE VALVE
VALVE SPRING
VENTURI TUBE
PUSH ROD
EXHAUST
CYLINDER HEAD
VENTURI COOLING FINS
CYLINDER BARREL
GAS TANK
FLY WHEEL
SUCTION TUBE
BREATHER TUBE
CRANK CASE
CAM FOLLOWER
ENGINE SUPPORT BRACKET
EXHAUST CAM GEAR
CAM DRIVING GEAR
IGNITION CAM
IGNITION POINTS
CAM FOLLOWER GUIDE



Brief Case Used As Seat

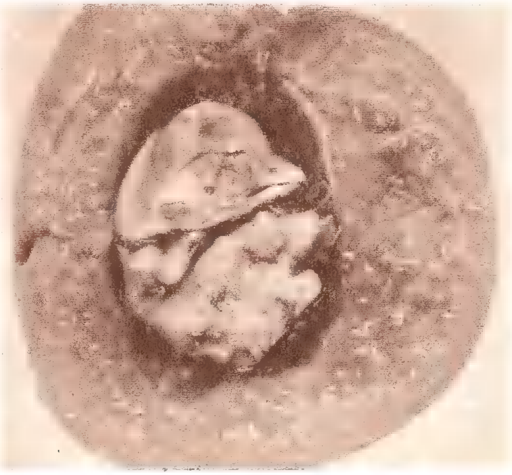
A BRIEF case that opens to form a seat has been invented by Kenneth Wade of New York. The inventor is shown above, demonstrating how a tired lawyer can rest in a court corridor.

Miniature Gasoline Engine

A TINY four-cycle gasoline engine which is complete in every detail was constructed by Merle Jenkins, Rochester, N. Y., tool maker. Its single cylinder has a quarter-inch bore and generates 1/160 of a horsepower. The engine is composed of 57 different parts.

Bird Embryo In Apricot

ORNITHOLOGISTS in California were confronted with a puzzle when an apricot was found there with a well-developed bird embryo inside it.

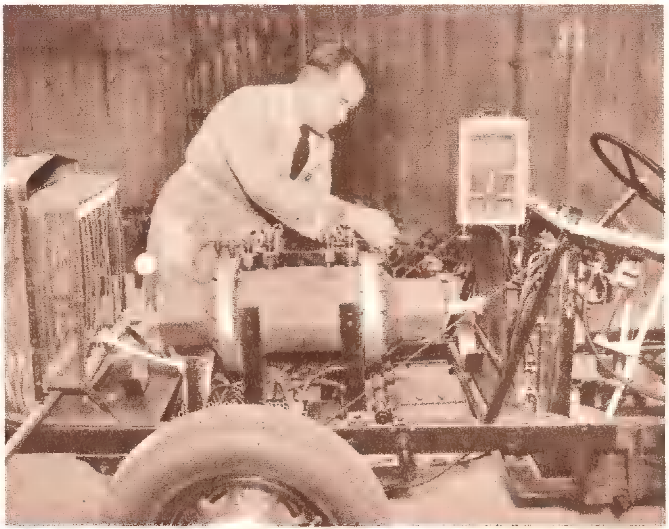


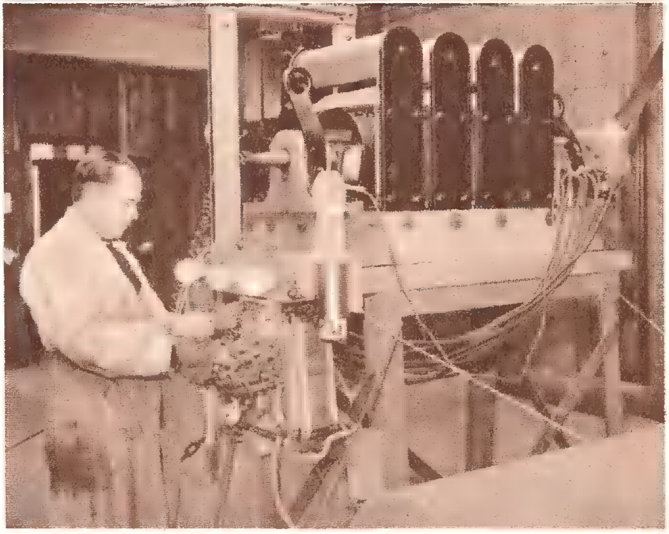
'Chute Pack Gives Pilot More Room

TONY LeVIER, airplane racing pilot, found difficulty in crowding his six-foot two-inch bulk into the tiny cockpit of his racing plane when he was wearing the usual seat pack or back pack parachute. So Rex Finney of California designed for him a special pack which serves as a headrest and takes up no cockpit space.

Cars, Planes To Run Without Gasoline

A NEW mineral ore much cheaper than radium but said to contain just as effective radioactive qualities has been discovered by a Belgian inventor. Experiments for its use in airplanes, automobiles and power plants have been under way for some time in England. Vehicles using this method of propulsion, which is known as Stap natural power, will not need gasoline, thus taking the fire hazard from airplane and automobile accidents. In England it is expected to prove useful as a national defense weapon.





Dresses Made

Milk passes through a heater into a skimming machine where it is separated from its cream. The skimmed milk then goes into a curdling boiler to be treated by chemicals which produce coagulation of casein. A press filter next eliminates whey from the casein.

The young lady shown at right is wearing a knitted wool blouse which was made from 16 quarts of milk. Her bathing suit was also made from milk.

Casein appears in the form shown in the photo at left before it undergoes a dissolving process with chemical reagents.

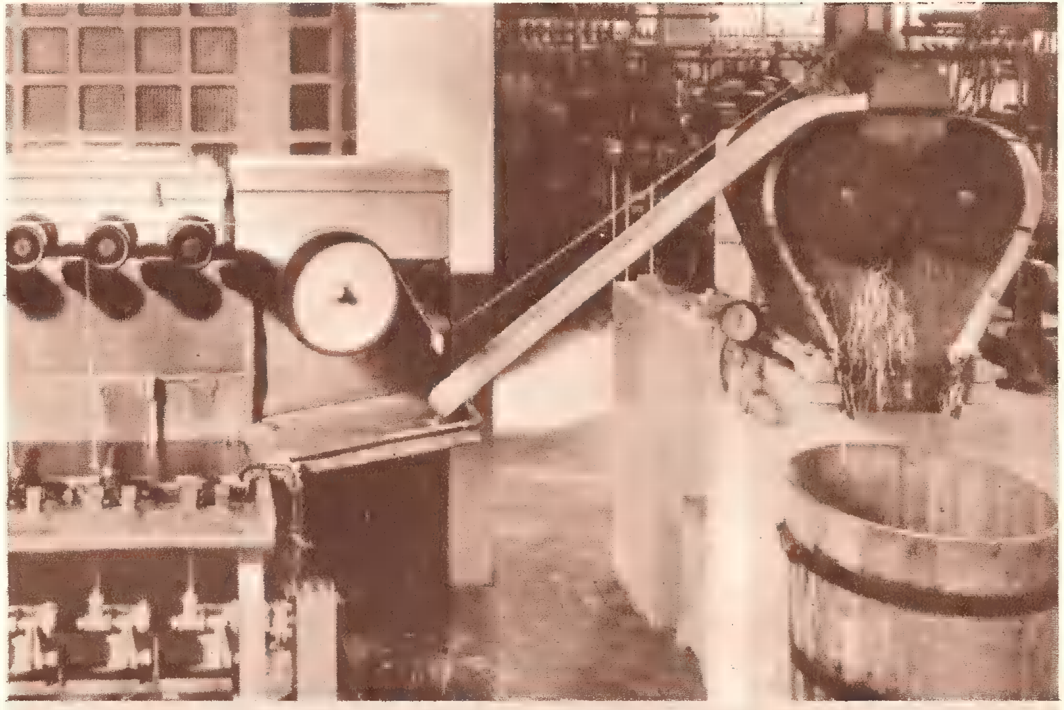
AFTER three years of research, tests and experiments the production of artificial wool from cow's milk has gone so far in Italy that the great Snia Viscosa rayon plant at Milan, Italy, is building a huge addition to its factory for the production of the new artificial fibre on a large scale. Wool is the raw material for which Italy has depended almost entirely on other countries, but when sanctions were

[*Continued on page* 127]

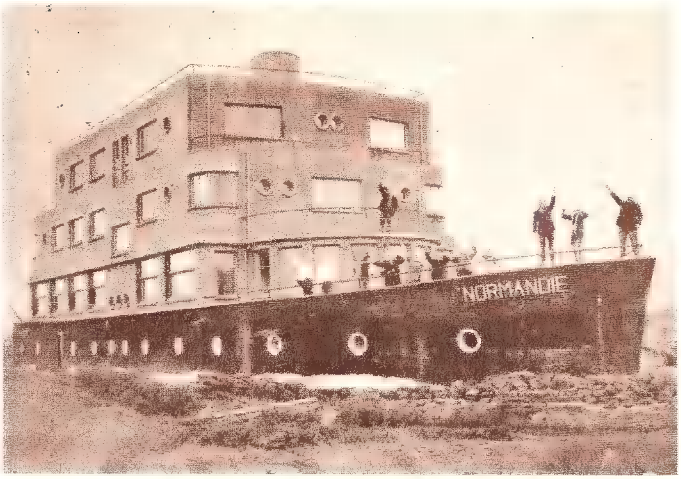
From Milk

The raw material shown below is finished and ready to be transformed into threads or skeins for the looms.

The smart fall outfit at right was made from 63 quarts of milk. Artificial wool is non-shrinkable, water resistant and cheaper than natural wool.

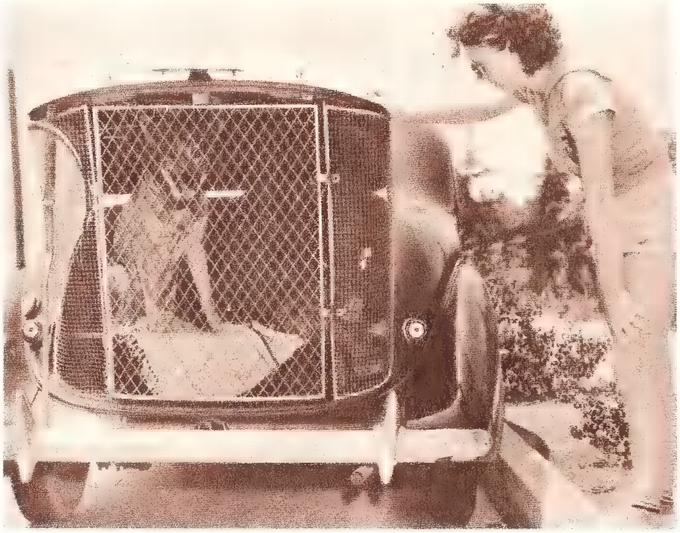


Casein in liquid form is forced through a platinum spinneret containing 600 minute holes. It then passes through a precipitating bath that solidifies it into filaments.



Hotel Patterned After Steamship

THE *Normandie,* one of the largest and speediest of trans-Atlantic liners, may remain at her pier in the Hudson River for the duration of the war, but the French will not forget her if a Frenchwoman near Ostend, Belgium, has her way. This hotel proprietress had her establishment, which contains 37 bedrooms, a restaurant and cafe, built in the form of a ship and named it after the famed luxury liner.



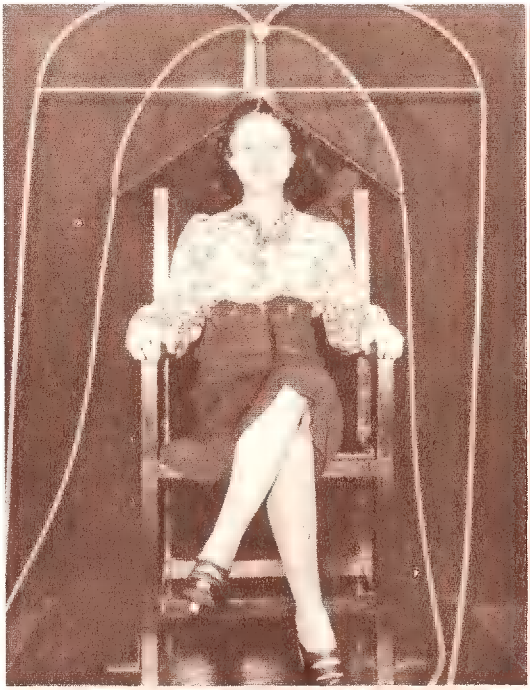
Dog Comfortable In Cage On Auto

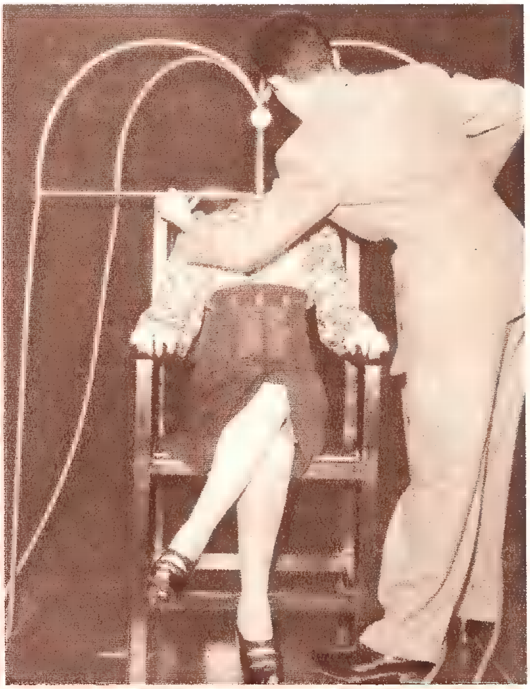
A CAGE which can be attached to the "turtle back" of a car provides a comfortable transportation compartment for a dog. It consists of heavy wire screen tied to a rigid skeleton bracing that is made to fit the opening when the back cover is lifted. Into eight small holes drilled into the body framework, on the inside so no damage is done to the car, fit supporting pins. The weight of the cover rests on the cage and holds it in place.

Chinese Walking Fish Exhibited

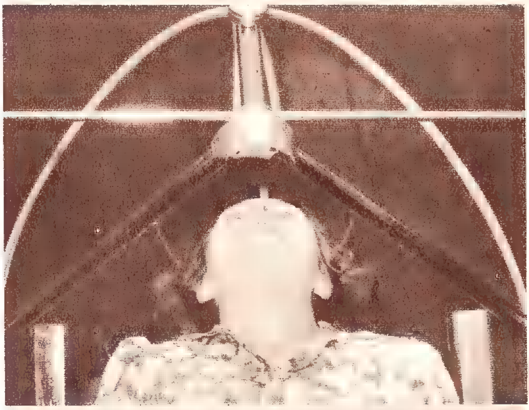
A PAIR of Chinese walking fish, believed to be one of the few pairs of this type of fish in the United States, entertained visitors to the New York World's Fair by walking up and down a six-foot slide. They are three years old and were born in Ohio. The male is about 10 inches long and the female about seven. In addition to their walking ability these peculiar fish are able to breathe out of water. They are fed red meat once a day.

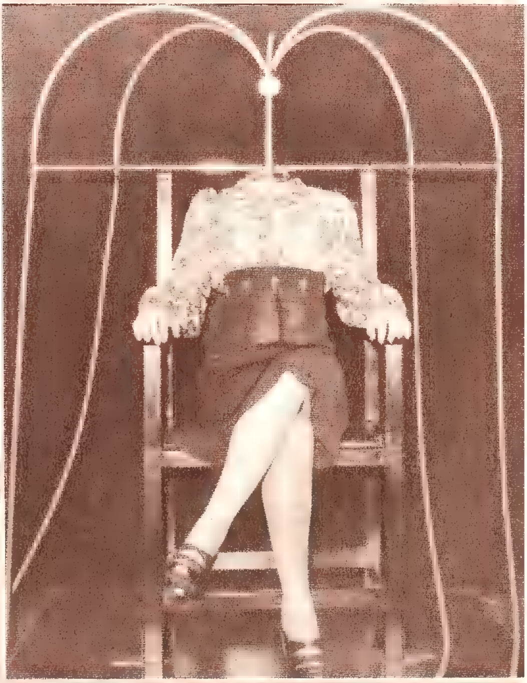
The "Headless" Woman





Above is Helena, apparently not a bit worried about her forthcoming "decapitation." Above right: The lecturer places the horizontal metal bar which supports the mirrored apparatus on framework of chair.





Above: Helena holds her head in position for the apparatus to be lowered. Right: The "headless" Helena is now set to meet her public. The neckpiece at the base of the pseudo oxygen tube completes the illusion of its passage into her body.

AN ILLUSION so perfect that spectators who have seen it actually believe it is the body of a living headless woman has been on display at the New York World's Fair, Ripley's Odditorium and Hubert's Museum in New York City.

During her appearances before the public Helena, the Headless Woman, sits in an

[*Continued on page* 130]

Shampoo Shade Saves Eyes

INSTEAD of objecting strenuously when they have their hair washed, youngsters get a kick out of it when they wear this new shampoo shade, because it keeps soap and water where they belong, on the hair and out of the eyes. Made of rubber, with pneumatic edges, this practical protector stays gently but firmly in place.

Orchard Heater Emits Gas

INSTEAD of creating a blanket of smudge, a new orchard heater invented by R. White of San Gabriel, Calif., converts cheap oil into gas and burns all the smoke-producing elements. These heaters, which are used to protect citrus groves against frost, are fed by small pressure pipe lines. Wound around the burning element in each heater are five feet of coiled copper tubing, in which the diesel oil is formed into a gas. The heaters are fitted with a top that causes the heat to spread around the sides before rising.

220 Yards Of Track In Model Railroad

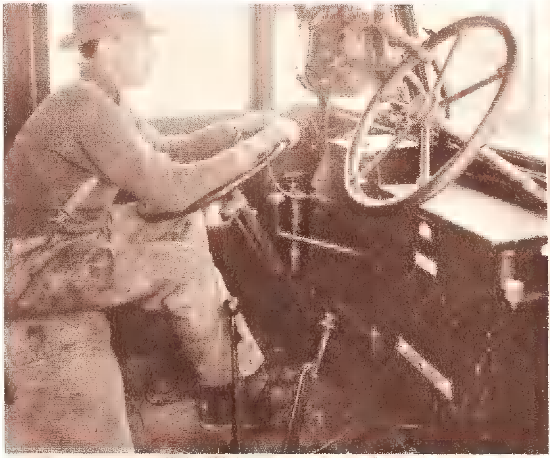
A MODEL railway system containing 220 yards of main line and with tiny ties laid in a real roadbed has been built to a scale of one-half inch to the foot by H. R. Howard, shop superintendent of the Pomona, Calif., schools, assisted by his brother, H. S. Howard, both ardent model fans. Trains are complete even to inside furnishings and equipment, and automatic block signals and switches are of the most modern type.

Radio Equipped Snow Plows

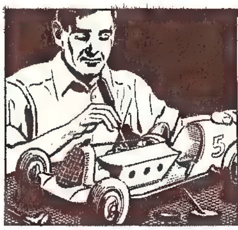
A NEW ally has been enlisted by California's Division of Highways in the annual fight against snow-blocked roads in the Sierra. Two-way radio communication between rotary snow plows and superintendents' headquarters now plays a dramatic part in assisting highway maintenance forces to keep California's main north and northeast gateways open.

Before this new system was installed, inadequate communication facilities greatly handicapped snow removal crews. Conditions change so rapidly when snow is drifting in the section below Mt. Shasta's glacier-clad,

[*Continued on page* 131]



Left: Radio equipment is conveniently located in front of plow operator. Above: Plow with radio antenna raised works in isolated mountain sector. Below: The foreman transmits instructions to a plow operator.



How to Build SECTION

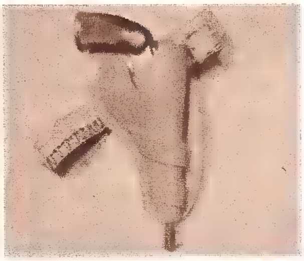
PICK YOUR PROJECT

Illustrated on this page are some of the things you can build from the plans and instructions given in this section. Select the one or ones that appeal to you, turn to page indicated.

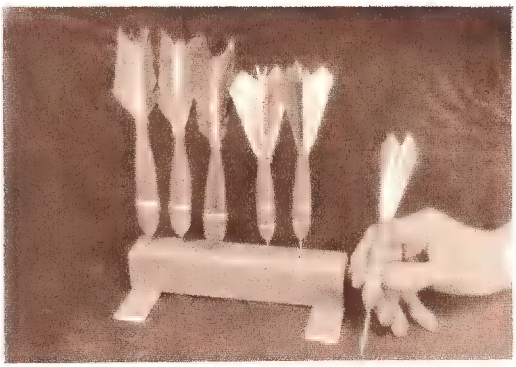
"Stone" Lantern for the garden. Made of cement over a wood frame. Plans on page 92.

Plywood Reindeer Sleigh. Attractive table decoration for the Christmas season. Page 101.

Make your own open end holster for pistol or revolver. Turn to page 88.

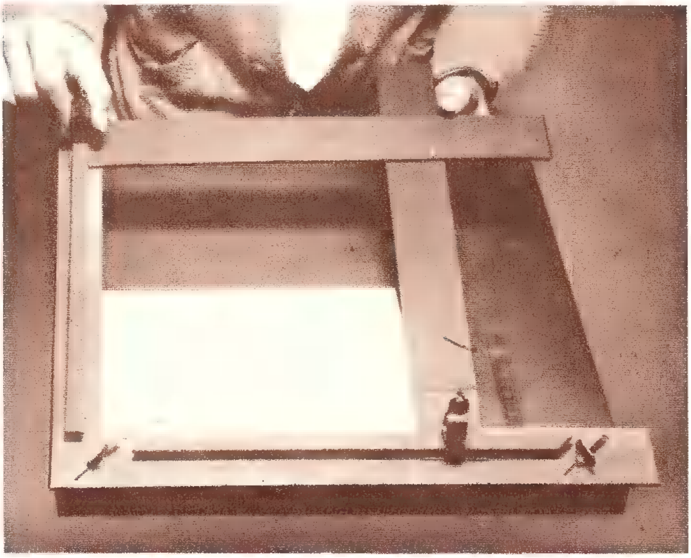


The Compact Five. Transmitting unit of the radio station whose receiver was described in last month's issue. Page 94.



Dart games for winter evenings are described and pictured on page 102.

Adjustable Photo Printing Easel



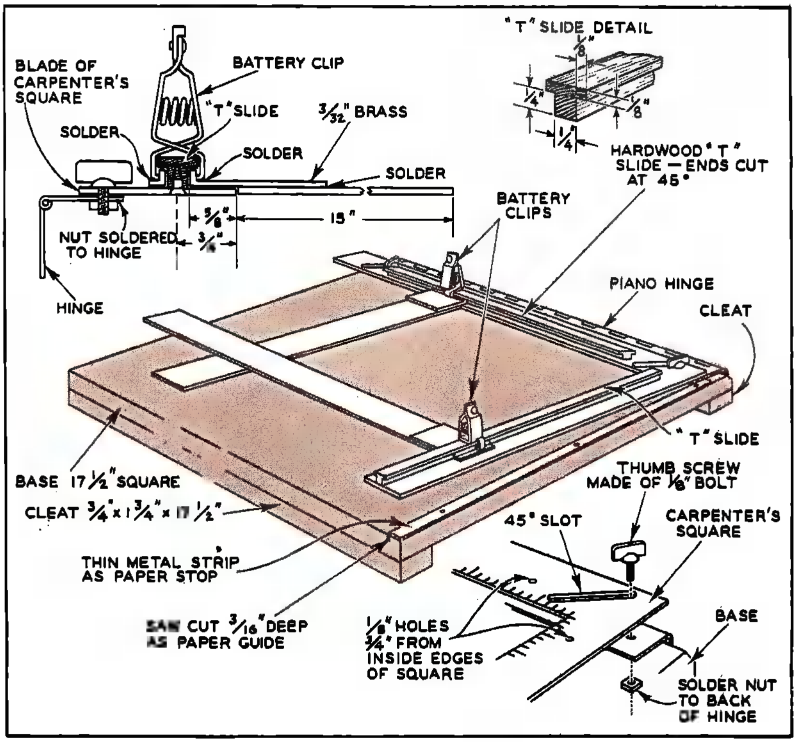
YOU can make this adjustable printing easel very inexpensively with two battery clips, a carpenter's square and a few pieces of wood. Cut two slots in the carpenter's square at 45 degree angles near the elbow and end of one side of the square, as shown. Slots should be wide enough to take ⅛-in. machine screws. Drill three holes ¾-in. from inside edges of both tongue and blade to take half inch flat head wood screws. Fill markings along inside of square with white paint. Make two T-shaped members of hardwood each 13 in. long and fasten on tongue. Cut one tongue with square ends and the other at 45 degrees, as shown.

Fasten wooden cleats on back of the base board, which should be about 17½ in. square and painted black. Cleats should be ¾-in. stock 1¼-in. wide. Drill two holes at each end of the piano hinge and solder 118-nuts to the underside. The exact point is determined by the location of the slots in the square. A thumb screw made from a ⅛-in. bolt, by soldering a part of a washer in the slot in the head, permits the square to slide freely.

Two thin metal strips serve as paper stops. Locate the strips along two sides of the baseboard to permit a ¼-in. margin when the carpenter's square is pushed outward to its limit. With the paper stops in this position, wider margins are possible by sliding the square inward.

Now make the sliding arms. Cut two pieces of $\frac{3}{32}$-in. brass material ½ by 2-in. Bend at right angles down their length. Now cut two more pieces 2 by 2 in. Bend one end of each to a right angle so that the turned up part is ¼-in. high. Now

[*Continued on page* 132]


BLADE OF CARPENTER'S SQUARE
BATTERY CLIP
SOLDER
"T" SLIDE
3/32" BRASS
SOLDER
SOLDER
5/8"
15"
3/4"
NUT SOLDERED TO HINGE
HINGE
"T" SLIDE DETAIL
1/8"
1/4"
1/8"
1/4
HARDWOOD "T" SLIDE — ENDS CUT AT 45°
BATTERY CLIPS
PIANO HINGE
CLEAT
"T" SLIDE
BASE 17½" SQUARE
CLEAT ¾"x 1¾" x 17½"
THIN METAL STRIP AS PAPER STOP
SAW CUT 3/16" DEEP AS PAPER GUIDE
THUMB SCREW MADE OF ⅛" BOLT
45° SLOT
CARPENTER'S SQUARE
BASE
⅛" HOLES ¾" FROM INSIDE EDGES OF SQUARE
SOLDER NUT TO BACK OF HINGE

MAKE THESE ORIGINAL

by Dale R. Van Horn

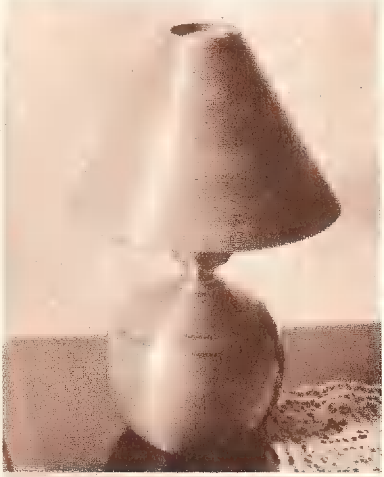
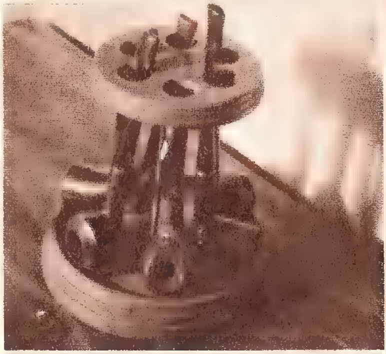
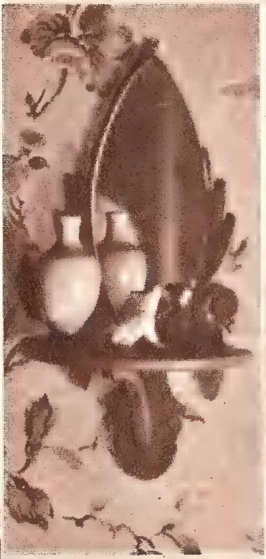


Table lamp with solid lead base and wound copper wire shade.

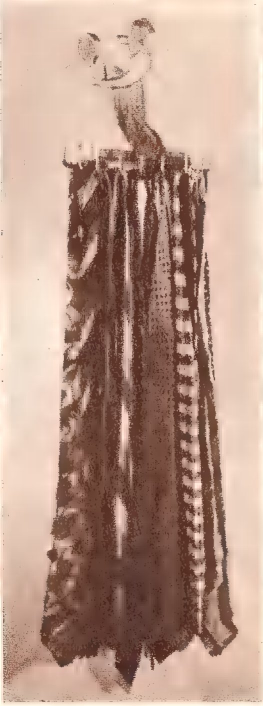
Name pin jigsawed from plywood.

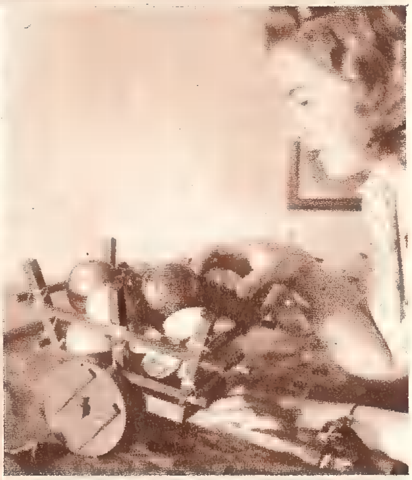


Lathe turned pipe rack in figured gum or walnut.



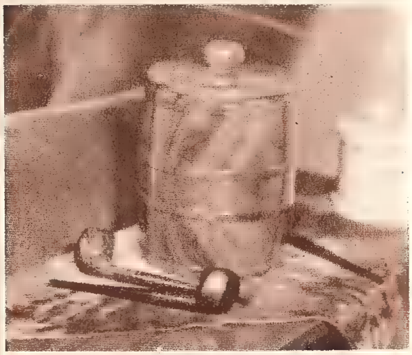
Attractive mirror whatnot (above) and tie rack with sports motif (below).





Primitive fruit cart finished in maple or walnut.

Leather-hinged cigarette box made to resemble a book.



All wood turned humidor that will keep tobacco *really* fresh.

CHRISTMAS GIFTS

Fill that Christmas list right in your own workshop.

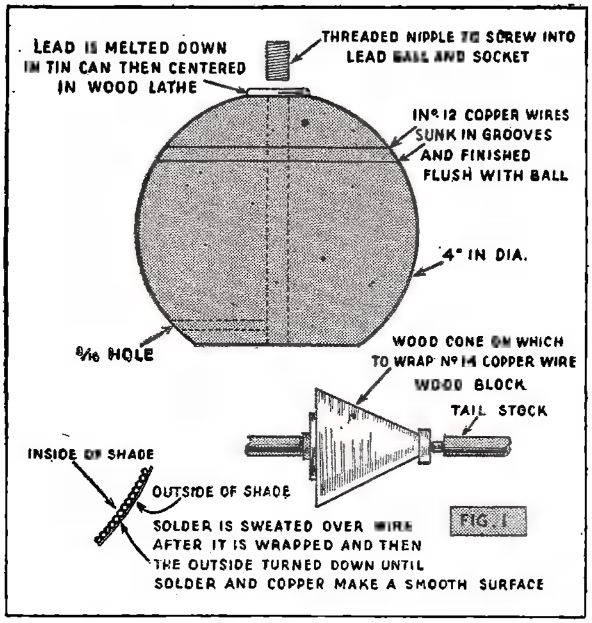

LEAD IS MELTED DOWN IN TIN CAN THEN CENTERED IN WOOD LATHE
THREADED NIPPLE TO SCREW INTO LEAD BALL AND SOCKET
Nº 12 COPPER WIRES SUNK IN GROOVES AND FINISHED FLUSH WITH BALL
4" IN DIA.
5/16 HOLE
WOOD CONE ON WHICH TO WRAP Nº 14 COPPER WIRE
WOOD BLOCK
TAIL STOCK
INSIDE OF SHADE
OUTSIDE OF SHADE
SOLDER IS SWEATED OVER WIRE AFTER IT IS WRAPPED AND THEN THE OUTSIDE TURNED DOWN UNTIL SOLDER AND COPPER MAKE A SMOOTH SURFACE

FIG. 1

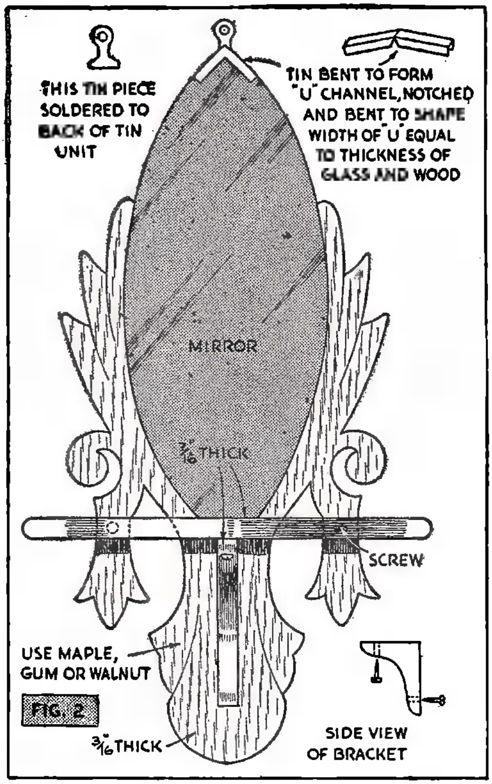

THIS TIN PIECE SOLDERED TO BACK OF TIN UNIT
TIN BENT TO FORM "U" CHANNEL, NOTCHED AND BENT TO SHAPE WIDTH OF "U" EQUAL TO THICKNESS OF GLASS AND WOOD
MIRROR
3/16" THICK
SCREW
USE MAPLE, GUM OR WALNUT
3/16" THICK
SIDE VIEW OF BRACKET

FIG. 2

THERE is no need of expounding the possibilities of the home workshop at Christmas time. That's been done before. Nor need the enterprising craftsman again be reminded that there's a pretty profit in some projects ideal for gift purposes.

Having a lot of ground to cover in limited space, let's take a look at the group to be described in this article. For Junior there's a tie rack. Dad's down for a humidor, pipe rack or cigarette book. An all-metal lamp, mirror whatnot and a fruit cart have been selected for mother. There's also a bracelet, wood initial or name pin. This grouping has been made to give you a choice for each member of the family. Or, if you wax especially industrious, you might make them all. So clear the benches! Let's go.

All-Metal Lamp (Fig. 1)

The base is solid lead, the shade a single, long piece of copper wire. It makes an ideal

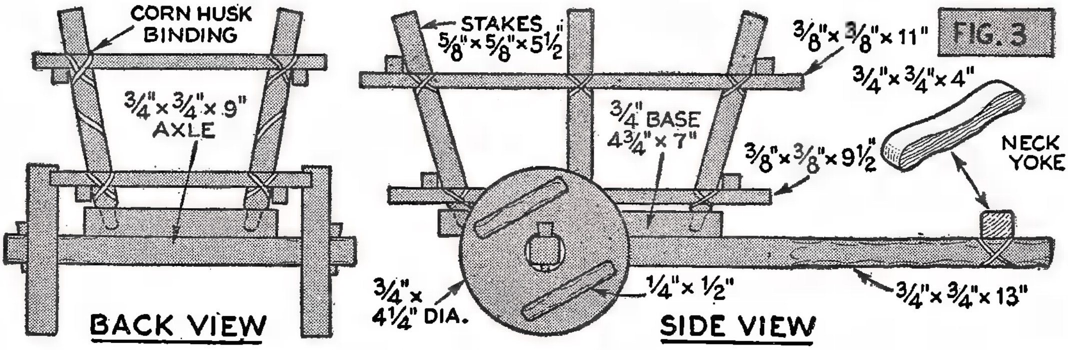

CORN HUSK BINDING
3/4"×3/4"×9" AXLE
BACK VIEW
STAKES 5/8"×5/8"×5 1/2"
3/8"×3/8"×11"
3/4"×3/4"×4"
3/4" BASE 4 3/4"×7"
3/8"×3/8"×9 1/2"
NECK YOKE
3/4"× 4 1/4" DIA.
1/4"× 1/2"
3/4"×3/4"×13"
SIDE VIEW

FIG. 3

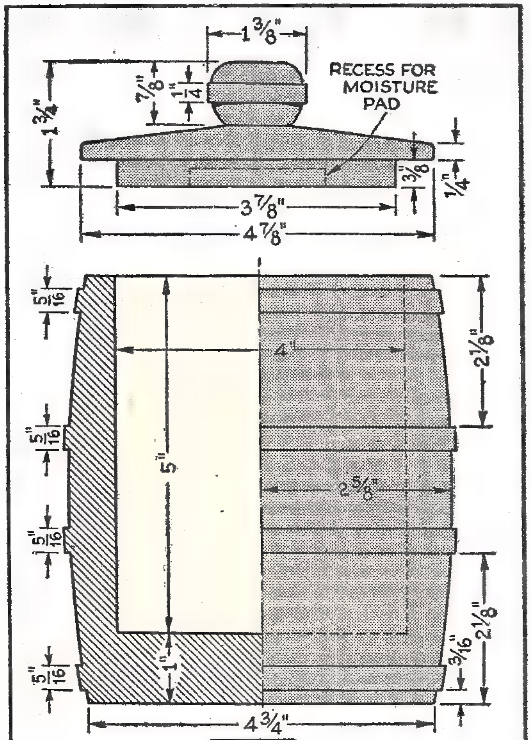

1 3/8"
RECESS FOR MOISTURE PAD
7/8"
1/4"
1 3/4"
3/8"
1/4"
3 7/8"
4 7/8"
5/16"
4"
2 1/8"
5/16"
5"
2 5/8"
5/16"
1"
3/16"
2 1/8"
5/16"
4 3/4"

FIG. 4

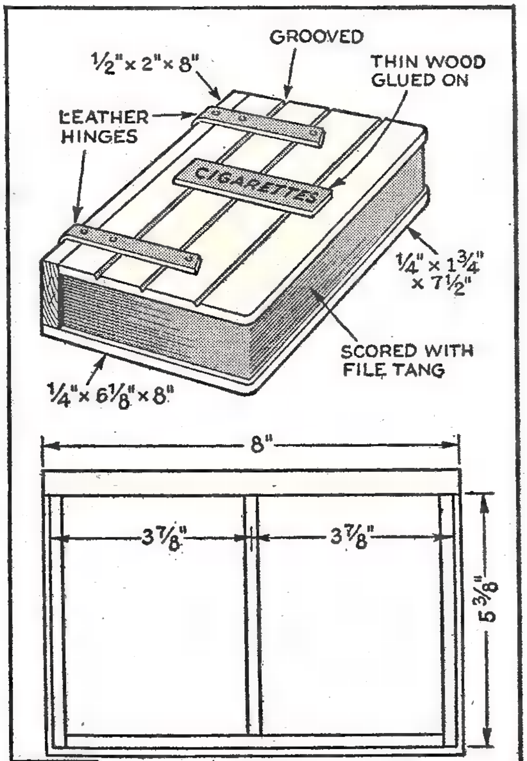

GROOVED
1/2"×2"×8"
THIN WOOD GLUED ON
LEATHER HINGES
CIGARETTES
1/4"×1 3/4" × 7 1/2"
SCORED WITH FILE TANG
1/4"×6 1/8"×8"
8"
3 7/8"
3 7/8"
5 3/8"

FIG. 6 TOP VIEW (WITHOUT LID)

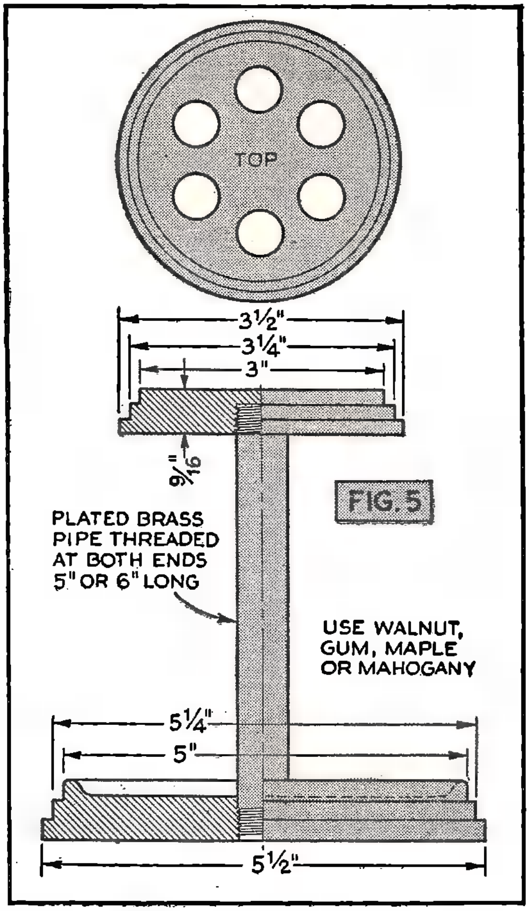

TOP
3 1/2"
3 1/4"
3"
9/16"
PLATED BRASS PIPE THREADED AT BOTH ENDS 5" OR 6" LONG
USE WALNUT, GUM, MAPLE OR MAHOGANY
5 1/4"
5"
5 1/2"

FIG. 5

night light. Melt down about 12 pounds of lead in a tin can whose diameter will give the resulting lead lump a diameter about equal to its height. Tear away the tin with pliers, fit the lead between the centers of a wood lathe, use a low speed and shape the ball with your regular wood turning chisels. The lead will come off in long strips. Chisel edges will wear about as long as when turning wood. Cut two grooves where indicated, tap in No. 12 copper wire with their ends just touching, then crimp in by rubbing with a wood block. Sand off the protruding wire until copper and lead are flush. Rub the ball down with No. 4 steel wool.

Drill a hole through the ball to take a threaded nipple which will screw into a light socket. Fit these in place. Bore a $\frac{3}{16}$-in. hole through from the side and run the wire through. Turn a wood cone of from 30° to 35° degrees, fit a wood block at the tail stock end, then wrap this with smooth, clean, No. 14 copper wire. Throw the flame of the blow torch over this, back and forth, and flow solder into all the recesses between wires. Later, sand or chisel down the outside of the shade until both solder and copper show through evenly. Clean all metal with a soda bath, then spray on clear lacquer. If you have no gun, dip the ball in lacquer, let the surplus run off, and brush the finish on the shade.

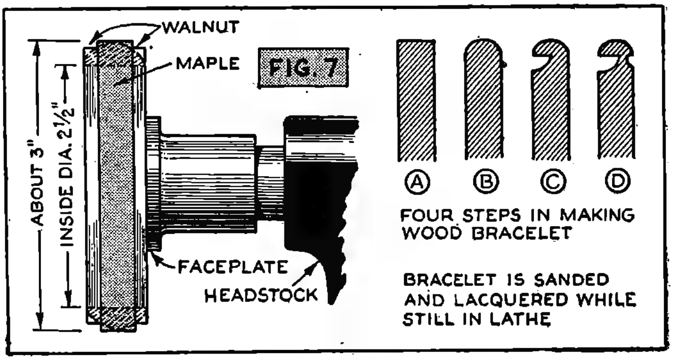
Mirror Whatnot (Fig. 2)

Lay out the design shown, or [redacted] similar, on $\frac{3}{16}$-in. or ¼-in. thick plywood faced with walnut or other appropriate wood. Cut out with the jig saw, making extended cuts as shown. Sand and finish. The shelf is [redacted] segment of [redacted] circle with rounded edges, $\frac{7}{16}$-in. thick. The bracket is cut from the same material. Screws hold the three wood parts together. You had better let a glass man cut the mirror. If he has waste looking glass, the cost will be slight. This can be cemented to the plaque with household cement. The tin clamp at the top prevents the point from working loose. A small brad put through the tin hanger into plywood will give added security.

Fruit Cart (Fig. 3)

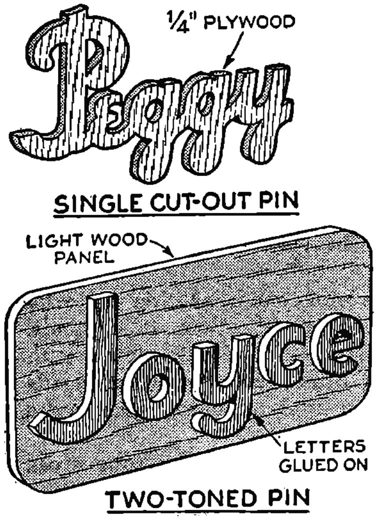
A rusticated cart that will hold fruit or cookies or candies. With no load at all, it still looks fine on the piano or mantel. White pine will serve nicely. You start with a block ¾-in. thick, 4¾-in. wide and 7-in. long. A square stick is nailed to the bottom whose protruding ends when slightly rounded, become the axles. On top of this is built the rack proper. With sloping corner stakes glued into holes for the foundation, square sticks are then lashed in place. This lashing consists, quite appropriately, of strips of inner corn husks. Nails and glue though hidden, add the real rigidity needed. The yoke is fashioned with [redacted] knife and likewise fastened. Wheels are cut out discs with hand hewn cleats. Pegs in holes in the ends of the axle hold the wheels in place. For finish, rub in maple stain, then finish with clear lacquer or shellac. An even neater job comes from the use of real maple or walnut.

[*Continued on page* 133]



FOUR STEPS IN MAKING WOOD BRACELET

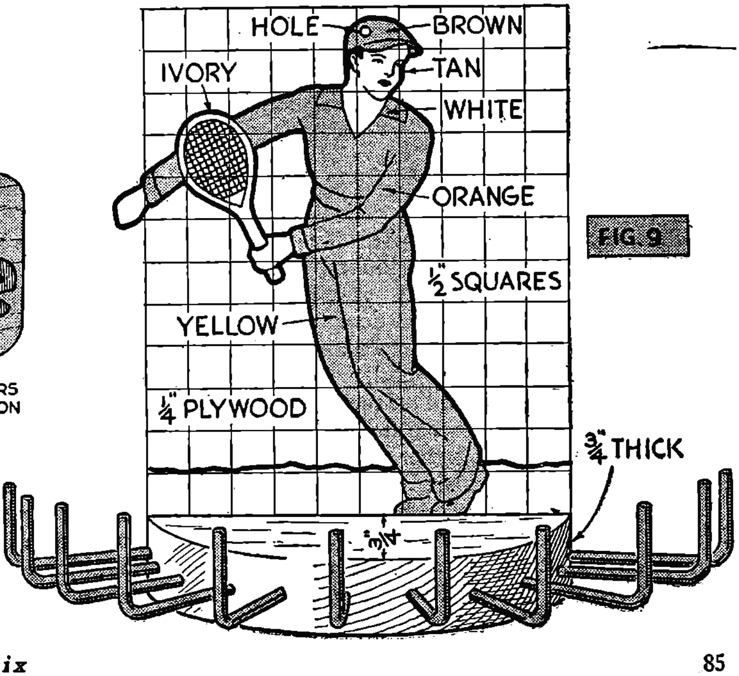
BRACELET IS SANDED AND LACQUERED WHILE STILL IN LATHE



SINGLE CUT-OUT PIN

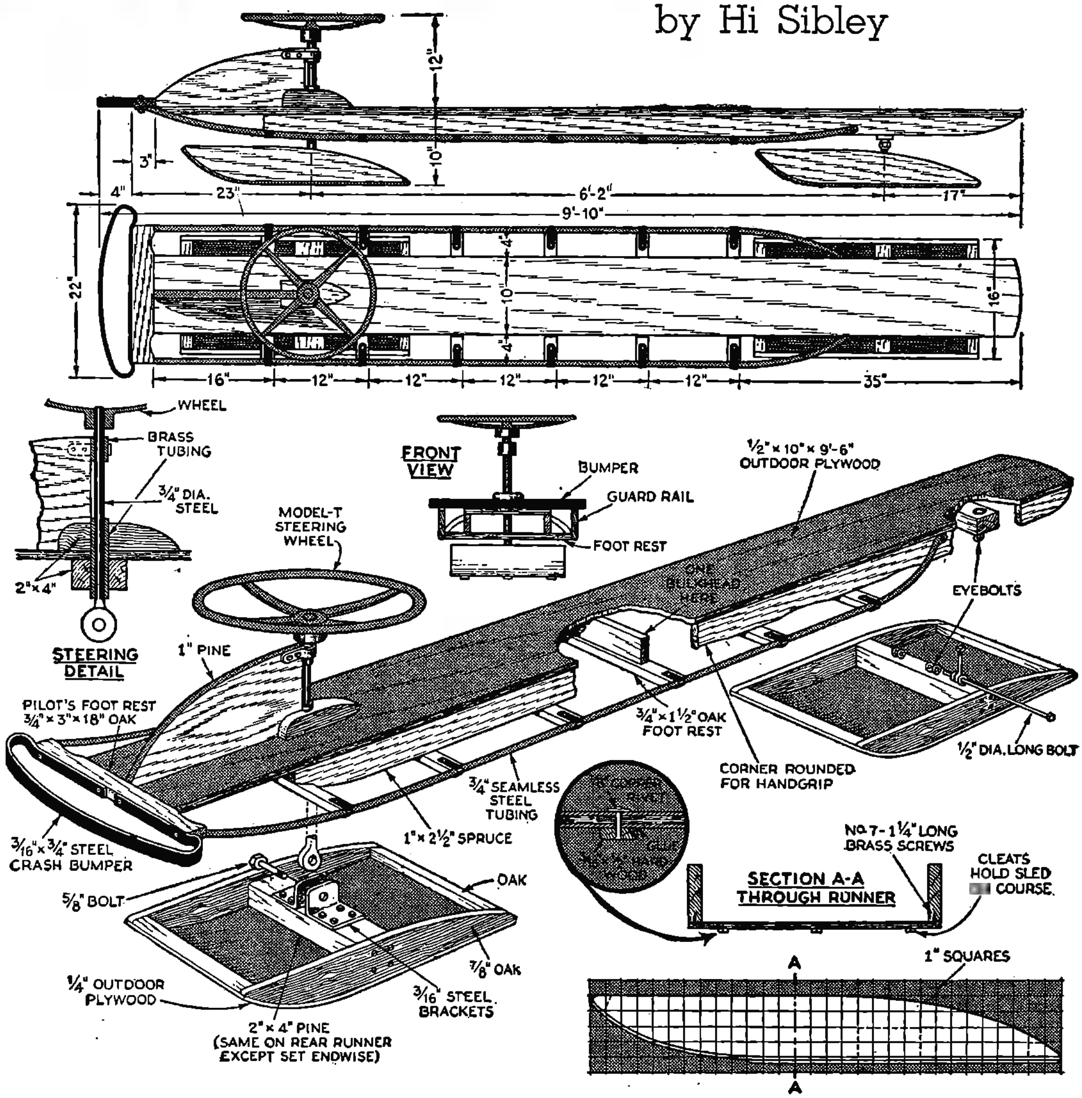
TWO-TONED PIN

FIG. 8



Build a SEVEN MAN BOBSLED

by Hi Sibley


12"
10"
3"
4"
23"
6'-2"
17"
9'-10"
22"
4"
10"
4"
16"
16"
12"
12"
12"
12"
12"
35"
WHEEL
BRASS TUBING
3/4" DIA. STEEL
2"×4"
STEERING DETAIL
FRONT VIEW
BUMPER
GUARD RAIL
FOOT REST
MODEL-T STEERING WHEEL
1/2"×10"×9'-6" OUTDOOR PLYWOOD
ONE BULKHEAD HERE
EYEBOLTS
1" PINE
PILOT'S FOOT REST 3/4"×3"×18" OAK
3/4"×1 1/2" OAK FOOT REST
1/2" DIA. LONG BOLT
CORNER ROUNDED FOR HANDGRIP
3/4" SEAMLESS STEEL TUBING
1"×2 1/2" SPRUCE
3/16"×3/4" STEEL CRASH BUMPER
No. 7-1 1/4" LONG BRASS SCREWS
CLEATS HOLD SLED [redacted] COURSE.
SECTION A-A THROUGH RUNNER
5/8" BOLT
OAK
7/8" OAK
1/4" OUTDOOR PLYWOOD
3/16" STEEL BRACKETS
2"×4" PINE (SAME ON REAR RUNNER EXCEPT SET ENDWISE)
1" SQUARES
A
A

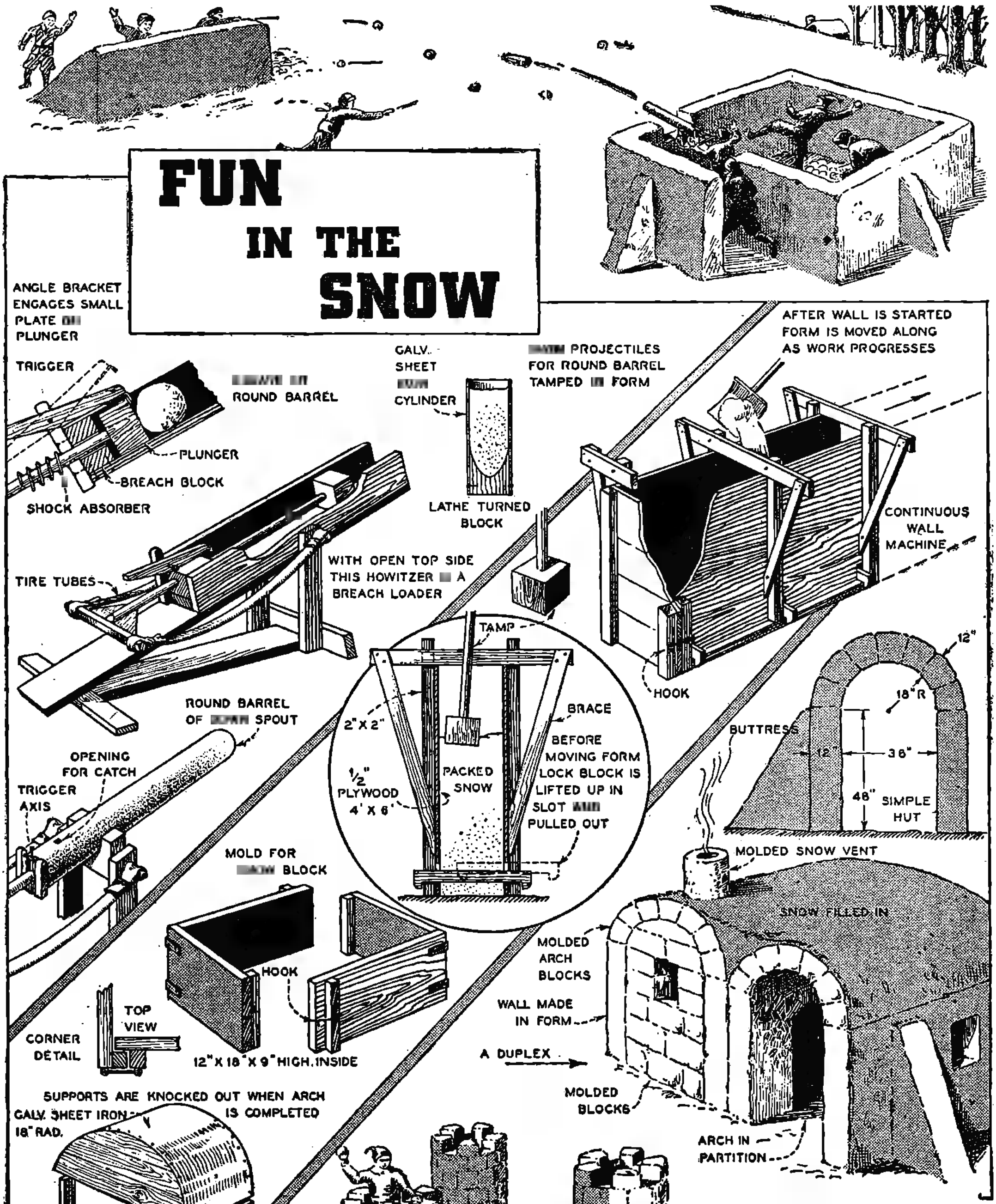
THIS novel bobsled, designed for virgin snow as well as the hard-packed runs, is exceptionally light without sacrifice of strength due to the use of outdoor plywood (Super-Harbord) for the plank and sleds. Two spruce side-members under the half-inch plywood plank form a box section of exceptional rigidity for the weight, and a seamless-steel guard rail together with a crash bumper reduce the hazards of the slide.

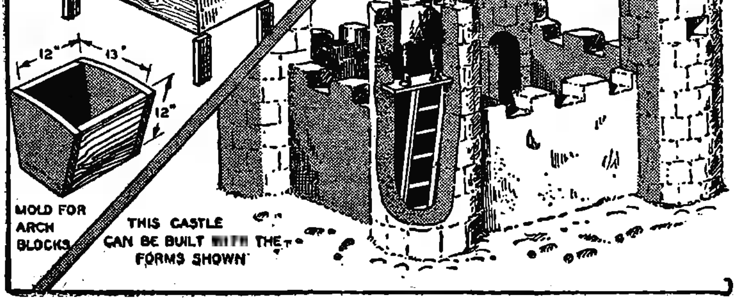
Sleds or bobs consist of oak side members with a 1/4-in. outdoor plywood bottom, the forward end bent up on a 13-in. radius to conform with the curve of the side member. In bending plywood, the inner or concave side should be moistened, [redacted] this material compresses more readily than it expands. Screw the plywood to the oak pieces with No. 7 flat-head brass screws, 1 1/4-in. heads countersunk, after applying casein glue to the contacting edges.

On the front runner a two-by-four cross member carries the steel yoke-bracket which swivels on the lower end of the steering shaft, as illustrated. By boring the hole in the shaft eye slightly larger than the bolt, and using heavy rubber washers on each side of the eye, considerable side-rocking motion is possible, such as encountered on rough snow.

[*Continued on page* 135]

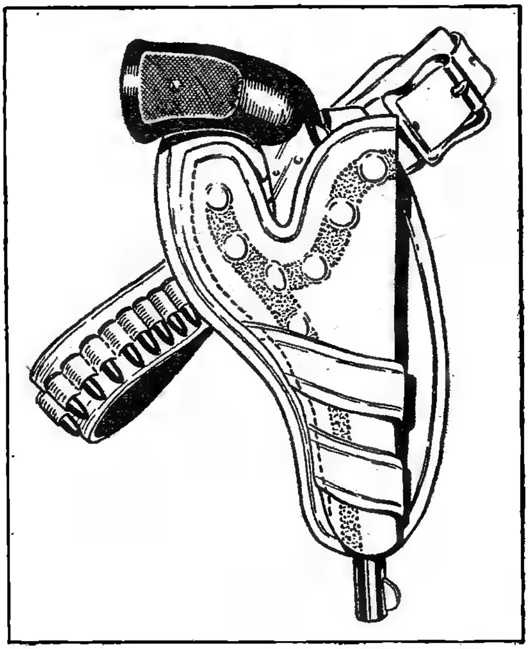
FUN IN THE SNOW


ANGLE BRACKET ENGAGES SMALL PLATE [redacted] PLUNGER
TRIGGER
[redacted] ROUND BARREL
PLUNGER
BREACH BLOCK
SHOCK ABSORBER
TIRE TUBES
WITH OPEN TOP SIDE THIS HOWITZER [redacted] A BREACH LOADER
GALV. SHEET [redacted] CYLINDER
LATHE TURNED BLOCK
[redacted] PROJECTILES FOR ROUND BARREL TAMPED [redacted] FORM
AFTER WALL IS STARTED FORM IS MOVED ALONG AS WORK PROGRESSES
CONTINUOUS WALL MACHINE
HOOK
TAMP
BRACE
2" X 2"
½" PLYWOOD 4' X 6'
PACKED SNOW
BEFORE MOVING FORM LOCK BLOCK IS LIFTED UP IN SLOT [redacted] PULLED OUT
ROUND BARREL OF [redacted] SPOUT
OPENING FOR CATCH
TRIGGER AXIS
MOLD FOR [redacted] BLOCK
HOOK
TOP VIEW
CORNER DETAIL
12" X 18" X 9" HIGH. INSIDE
12"
18" R
BUTTRESS
12"
36"
48"
SIMPLE HUT
MOLDED SNOW VENT
SNOW FILLED IN
MOLDED ARCH BLOCKS
WALL MADE IN FORM
A DUPLEX
MOLDED BLOCKS
ARCH IN PARTITION


SUPPORTS ARE KNOCKED OUT WHEN ARCH IS COMPLETED
GALV. SHEET IRON 18" RAD.
12"
13"
12"
MOLD FOR ARCH BLOCKS
THIS CASTLE CAN BE BUILT [redacted] THE FORMS SHOWN

WITH the snow molds illustrated here a group of boys can make forts, houses, castles of any size they [redacted] to take the trouble to build. The continuous-wall machine makes the construction of a long wall neat and easy.

[*Continued on page* 130]



Drawing above shows the finished holster with cartridge belt, ready to use

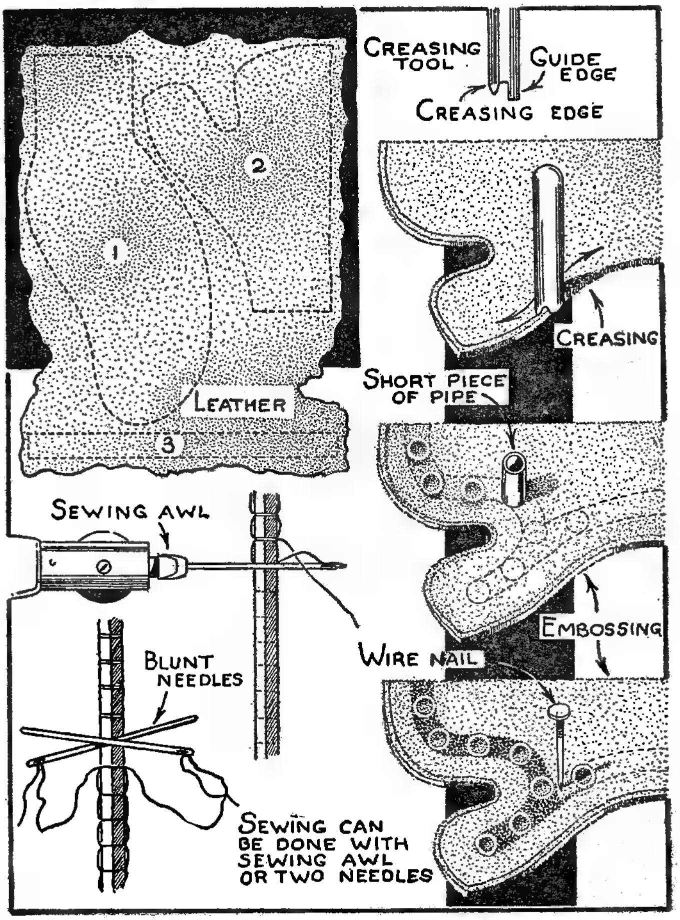
Make Your Own PISTOL HOLSTER

by Harold Jackson

MAKING your own holster is a lot of fun and it can be accomplished with very ordinary tools. The piece of leather from which this holster was made cost but forty-six cents, which is only a fraction of the price of a factory made holster. At the same time it is a "tailor-made" holster that fits the gun perfectly. This holster is of the open end type which allows the muzzle to extend out at the bottom. Black or russet leather can be used and is obtainable at any shop where leather goods are repaired. The sewing can be done with a leather sewing awl if you have one, but just as good a job is possible using two blunt needles, punching the holes first with a common awl. The methods of sewing are shown in the sketch.

The size of the piece of leather needed will depend upon the size of your gun. A piece 9-in. wide and 12-in. long is large enough for the average size gun. Three pieces of leather are needed and these are cut out as shown in the sketch. No. 1 is the back piece and it has a projecting part at the top which is folded back and sewed down to form the belt loop. The loop should be large so a cartridge belt can be easily slipped through it. No. 2 is the front piece. These parts are roughly cut at first to allow for trimming-to-fit as the work progresses. No. 3 is cut in two to make the straps across the front. When cutting the leather be sure to cut it right so that the finished side of both pieces will come to the front. The dotted lines in the sketch show the right way to cut the leather.

By laying the gun on No. 1 and fitting No. 2 over it the final trimming can be done. Crease all edges with the home-made creaser shown

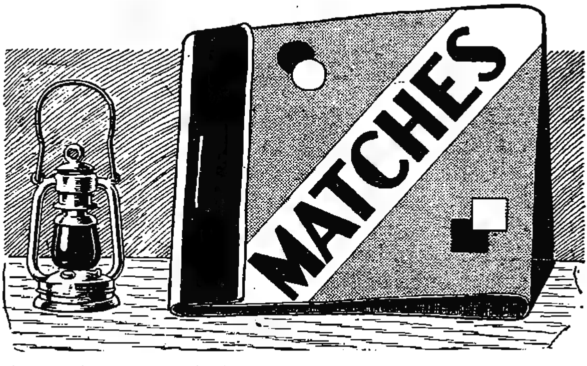


in the sketch except the straight edge of No. [illegible] and the ends of the strap. The crease or groove along the edge is made by pushing the tool back and forth along the edge using considerable downward pressure. When the creasing is completed the embossing is done on piece No. 2. Any design can be used but some simple border such as shown gives a good finish to the holster. The rings in this design are made with a short piece of iron pipe that has a smooth edge at one end. The pipe is placed in position and struck a sharp blow with a hammer. The leather should be placed on an anvil or old flat iron so as to get a good impression. The stipple work between the rings is done in the same manner using an eight penny wire nail. The design should be marked out first to insure even spacing of the rings and even edges for the stipple work.

Sewing the parts together is the next step. All edges to be sewed down should be thinned by beveling them off with a sharp knife to make a smooth job. Two methods of sewing are shown and one is just as good as the other. The sewing should be done with waxed linen thread. First the belt loop is folded back and sewed down. Then the straight uncreased edge on No. 2 is sewed to No. 1. Pull the thread tight and make the stitches even. Do not forget to put one end of the muzzle straps into this seam. The third and last seam is up the under side of the barrel and around the trigger guard. This completes the holster.

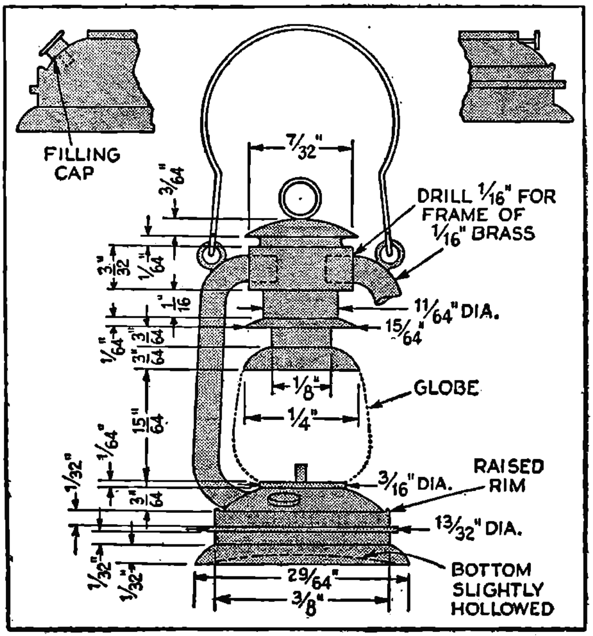
Lathe Turned Lantern Watch Charm

ESPECIALLY appropriate for model makers and railroad fans, the lantern watch charm here pictured beside an ordinary book of paper matches offers an interesting job in precision turning. All parts are brass, joints being silver soldered. The top turning has a $\frac{1}{16}$-in. hole drilled transversely through the $\frac{7}{32}$-in. diameter. A $\frac{1}{16}$-in. brass rod (burnished with emery cloth if necessary to make a fit) is inserted and silver soldered fast. The soldering will anneal it to permit of easily bending to shape. File lower ends to fit the convex base and silver solder in place.

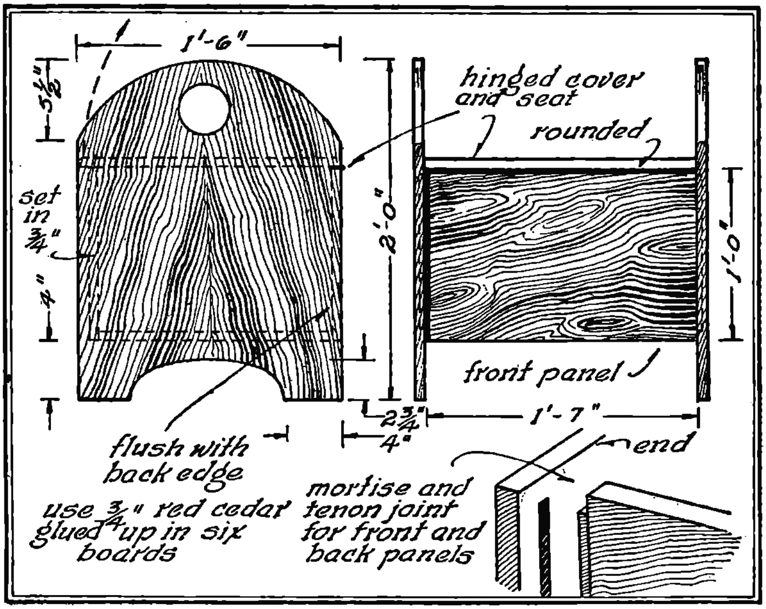


Size of this little watch charm is shown by above comparison to an ordinary book of matches.

The bottom of the base turning is slightly concave, and a $\frac{1}{32}$-in. hole is drilled through the center while in the lathe. The lantern globe is turned of transparent plastic (catalin, lucite, or similar material) and held in place by a bit of $\frac{1}{32}$-in. rod driven into the center hole. The rod projects a little into the globe, where it appears as the wick. Note the raised rim just below the convex top of the base turning. Filling cap and wick turn-up are small turnings, soldered into holes drilled in the base. Handle and top ring are of thin brass wire.



Polish by rubbing compound on a piece of soft string, one end of which is held in a vise, while the lantern is carefully rubbed back and forth along it. Avoid using a buffing wheel, which will deposit a thick film in corners.—*H. W.*


1'-6"
5¼"
set in ¾"
4"
2'-0"
hinged cover and seat
rounded
1'-0"
front panel
2¾"
4"
1'-7"
end
flush with back edge
use ¾" red cedar glued up in six boards
mortise and tenon joint for front and back panels

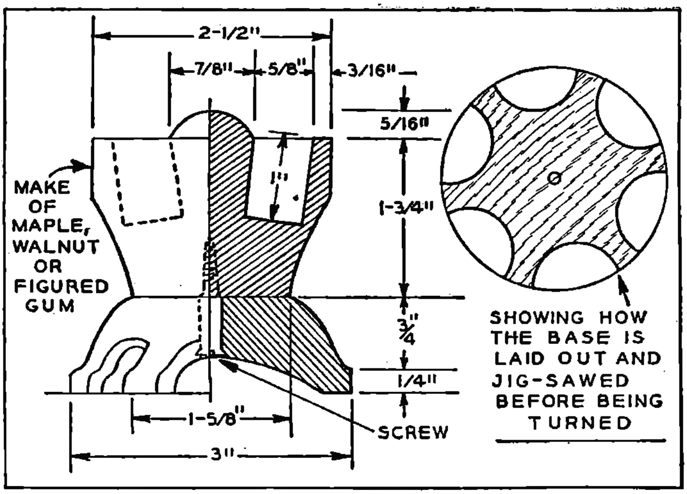
Cedar Locker Seat

THIS aromatic cedar seat can be used for a number of things in the bedroom or den, the broad cover serving as the seat to the locker stool. Use six glued-up pieces of red cedar, ¾-in. thick for the front and back panels, seat top, bottom and ends of the seat. The upper ends of the end boards are arched as shown, and a 3-in. hole is cut in each end for handy hand grips. An arched opening is cut in the lower end of each board, leaving legs about 4-in. wide. Each end board is 18-in. wide and 2 feet high. The front and back panels are 19¾-in. long by 12-in. wide, the ends being cut into tenons as shown. The tenons are ⅜-in. long and ½-in. thick, fitting mortises cut in the ends. Set the front panel back ¾-in. from the front edge of the ends, allowing the cover to overhang ¾-in. making it easy to lift the cover. Fasten two counter-sunk hinges at the back edge of the cover and in the upper edge of the back panel, as shown, permitting the cover or seat to be easily lifted. Bottom of the locker is cut out to fit between the front and back panels and fastened in place with finishing nails, counter-sunk and covered with putty. Scrape to bring out the grain, and finish with a coat of clear lacquer.—*G. V. H.*

Toothpick Holder

HERE is a good usable project for a short evening—a toothpick holder with two compartments. Made of two pieces, both being probably scrap, the base has [illegible] legs which are formed with a bit of work at the jig saw.

Use the small, center screw face plate for both turnings. Turn the top block to shape, then bore the holes 1-in. deep and ⅝-in. in diameter on opposite sides at about the angle shown. Then replace in the lathe and finish with a wax rub down. Lay out the base block as shown, scribing six arcs along which the jig or band saw blade is guided. Then the piece is put in the lathe and turned to the shape shown.

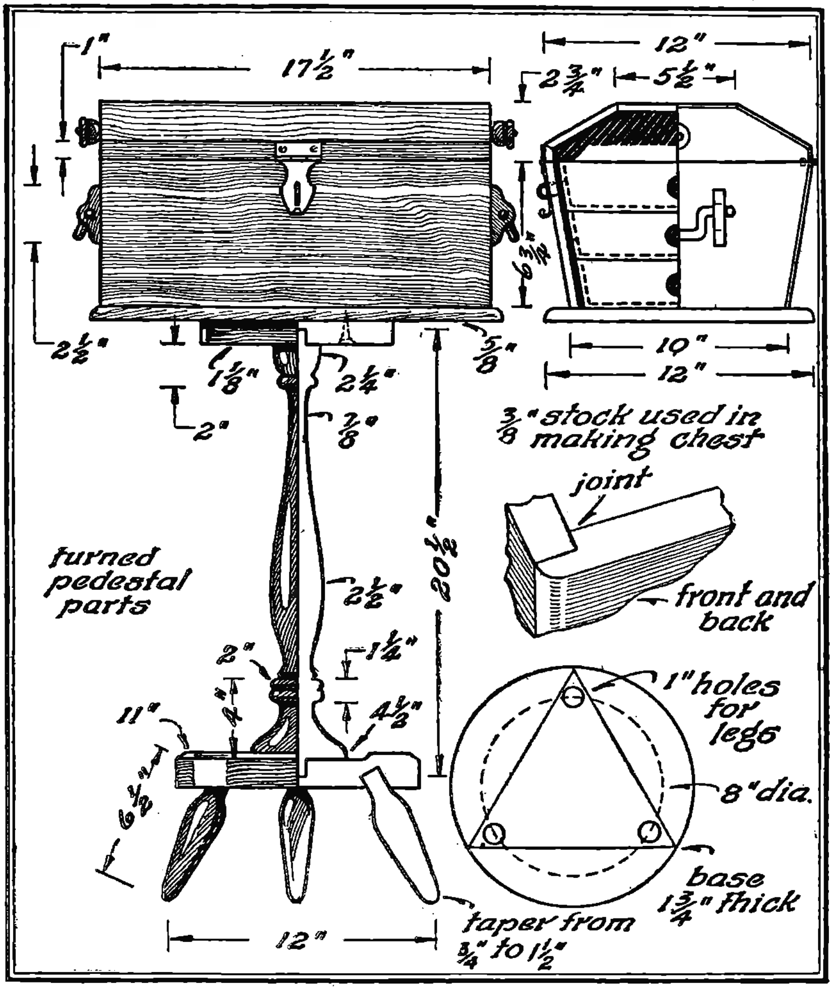

2-1/2"
7/8"
5/8"
3/16"
5/16"
1"
1-3/4"
¾"
1/4"
MAKE OF MAPLE, WALNUT OR FIGURED GUM
1-5/8"
3"
SCREW
SHOWING HOW THE BASE IS LAID OUT AND JIG-SAWED BEFORE BEING TURNED

Some care must be exercised at the outer rim with the chisels and this is particularly true with the sandpaper, else a mishap may occur. Make as smooth a cut as possible with the chisels to minimize use of sandpaper.

A long wood screw is turned through the hole in the base and into the upper block to assemble the holder.—*D. V. H.*

A SILVER CHEST STAND

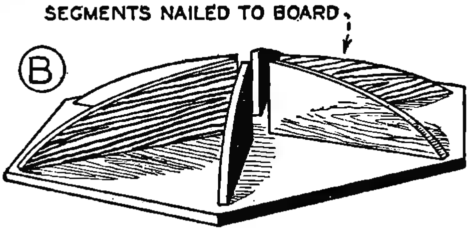
For Christmas



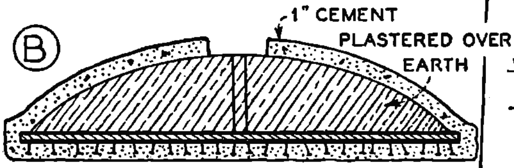
THE pedestal of the chest is assembled from six turned pieces. The top block is finished 9-in. in diameter, 1-in. thick, with a hole bored in the center to take a ¾-in. dowel. The standard is turned from a block 4½-in. square at the ends and 20½-in. long to the dimensions shown, with a ¾-in. dowel turned at each end. The base is 11-in. in diameter and 1¾-in. thick, with a beveled upper edge and a depression turned in the center of the top. Each of the three legs is finished 6½-in. long, tapering from ¾ to 1½-in. in thickness, with 1-in. dowels at the upper end. Mark an 8-in. circle on the bottom of the base, dividing the circle into three parts and boring holes with the base block set on a jig so that the holes will have the same angle. The short legs should have a spread of from 12 to 13-in.

The chest is constructed of ⅜-in. stock cut out and assembled as shown. Adjoining edges of the lid are beveled and glued while all end joints are made as indicated, and the corners rounded slightly. The base of the chest is 18½-in. long and 12-in. wide, while the bottom of the finished chest is 10-in. wide and 17½-in. long. Use ⅝-in. stock for the chest base, cutting mortises and gluing the lower edges of the chest in the base board. Handles and supports at the ends of the chest are cut out and whittled out as shown, and the supports fastened to the ends with screws. Knobs can be turned and glued to the ends of the lid, or these may be left off if the brass staple and hasp is fitted on the front as shown. Use countersunk brass hinges at the back. Cut out the parts for the three trays from ¼-in. stock, with end joints as used in the chest construction. Cut out the ends of the trays in two pieces, each piece fitting snugly inside the chest. Then saw each piece into three pieces of equal depth, boring finger holes in the center. The bottoms of the trays are cut to fit inside the bottom. Either gum, maple or walnut can be used for the stock, in constructing the chest and pedestal. This unusual and attractive silver chest is ideal as a Christmas gift with a personal flavor that purchased presents lack.—*G. E. Van Horn.*

HOW TO MAKE A "STONE"

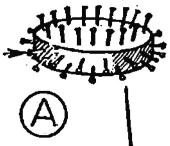

SEGMENTS NAILED TO BOARD
B

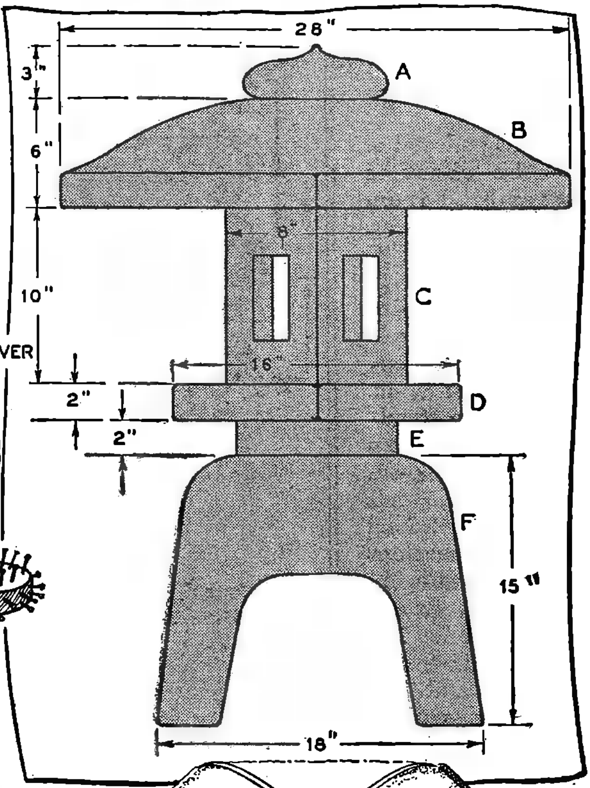
4"X 26" ROOF FORM MADE OF ½" OUTDOOR PLYWOOD

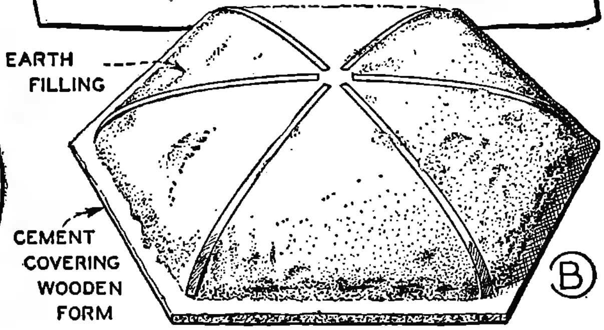

B
1" CEMENT
PLASTERED OVER EARTH

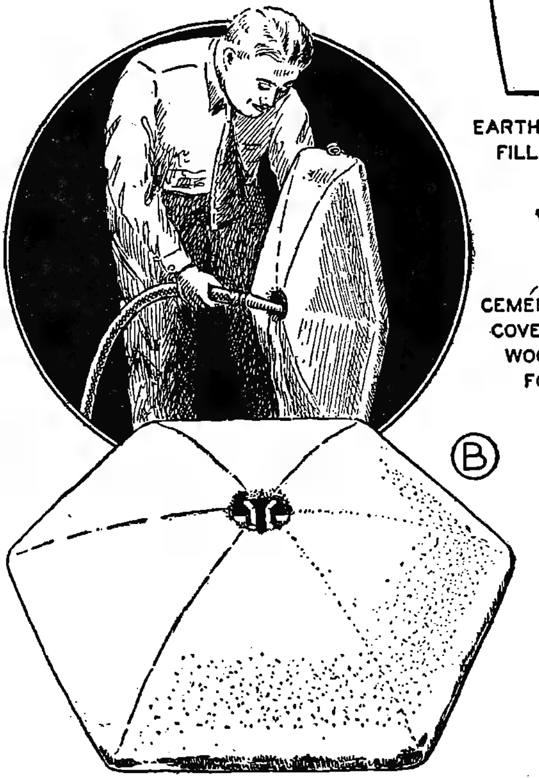
BOTTOM PLASTERED FIRST- THEN FORM IS TURNED RIGHT SIDE UP AND FILLED FLUSH WITH EARTH.

5" WOODEN DISK - STUDDED WITH GALVANIZED NAILS




28"
3"
A
6"
B
8"
10"
C
16"
2"
D
2"
E
F
15"
18"


EARTH FILLING
CEMENT COVERING WOODEN FORM
B

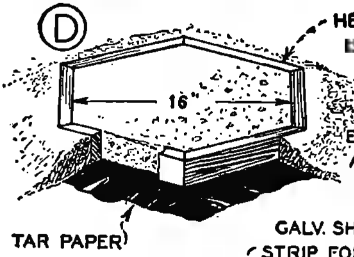


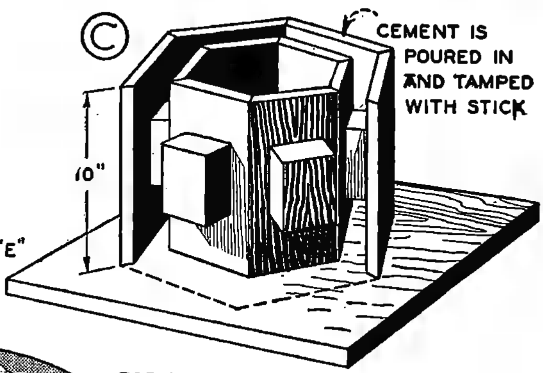
EARTH FILLING IS WASHED OUT WITH HOSE THRU HOLE LEFT IN TOP OF CEMENT ROOF PIECE

THE massive stone lanterns which add such a picturesque touch to the garden are quite expensive because of the labor involved in sculpturing them from solid rock.

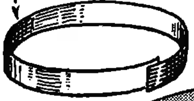
A very substantial copy, however, can be made by plastering cement over wooden forms as shown here. Each section is built separately, making the work easy. The cap "A" is simply a wooden disk studded with galvanized shingle nails and plastered over with a mixture of 1 part portland cement, 4 parts clean, sharp sand and 1½ parts water. It should be fairly stiff to hold its shape in its green condition. For the roof "B" a wooden skeleton is made as shown, the flat

LANTERN FOR YOUR GARDEN

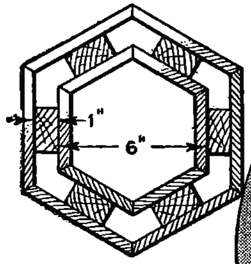

D
HEXAGONAL DISK [redacted] MOULDED ON GROUND
16"
EARTH PACKED AROUND FORM
TAR PAPER


C
CEMENT IS POURED IN AND TAMPED WITH STICK
10"

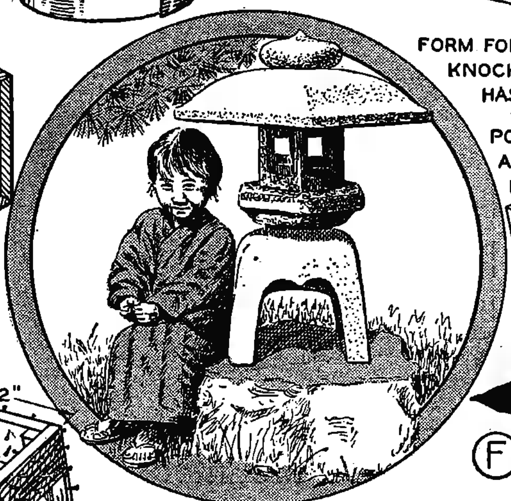
FORM FOR LANTERN SECTION—KNOCKED APART AFTER CEMENT HAS SET.



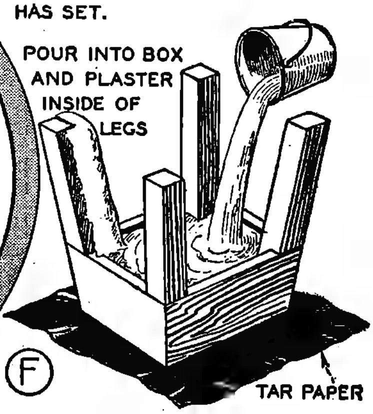
GALV. SHEET IRON STRIP FORMS MOULD FOR "E"


OUTDOOR PLYWOOD
1"
6"

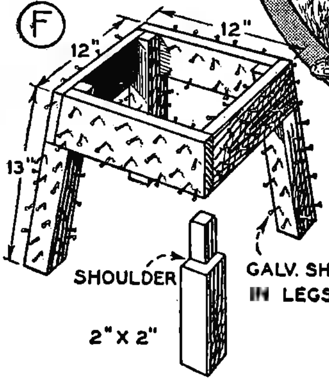
SECTIONAL VIEW OF FORM "C"



THE ORIGINAL OF STONE IN A TOKIO GARDEN

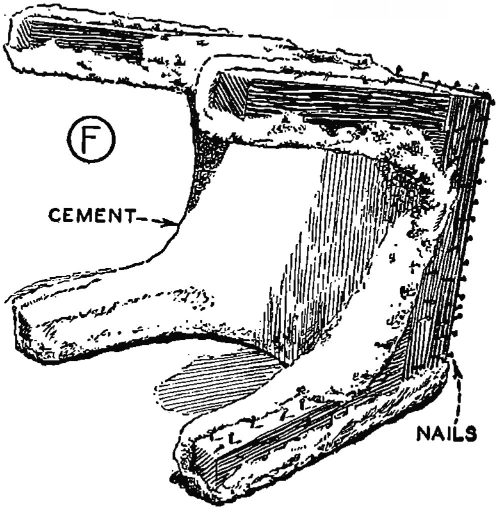

POUR INTO BOX AND PLASTER INSIDE OF LEGS
F
TAR PAPER

TURN RIGHT SIDE UP AND FINISH PLASTERING AS SOON [redacted] CONDITION OF CEMENT PERMITS.


F
12"
12"
13"
SHOULDER
2" X 2"
GALV. SHINGLE NAILS [redacted] LEGS AND FORM

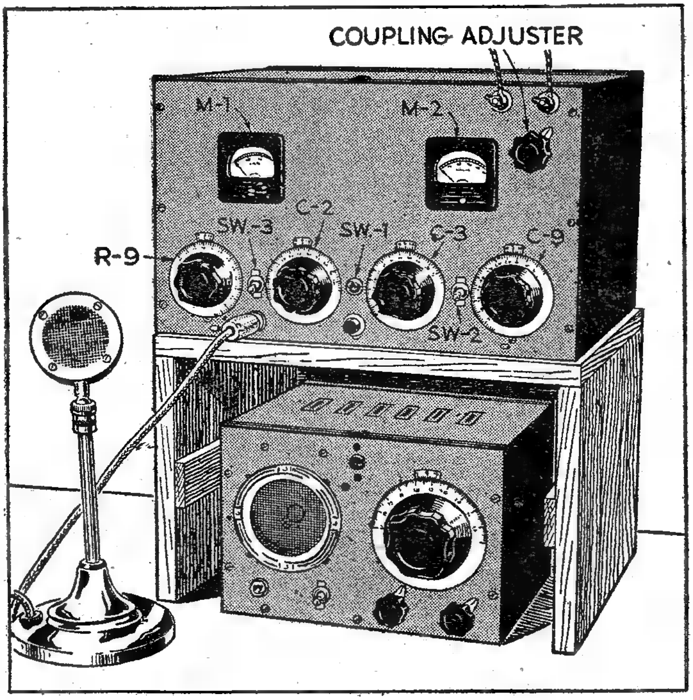
bottom plastered over 1-in. thick. As soon as it hardens enough to be turned over, fill the pie-like sections with soil, smoothing them flush with the partitions, and plaster over, as shown, leaving a 4-in. hole in the top through which the dirt is flushed with a hose. If you are [redacted] skillful craftsman you may be able to dispense with the wood skeleton and simply make a form of damp soil, making the top first, then when it has set, turn the shell over, fill level with dirt and plaster on the bottom. A hole should be left to wash out the dirt core later. The hexagonal lantern section "C" is poured into a wooden form and tamped down with [redacted]

[*Continued on page* 142]


F
CEMENT
NAILS

FIRST STEP IN MAKING BASE—NAILS ARE DRIVEN PART WAY INTO WOODEN LEGS; UPPER SECTION [redacted] BOX FILLED WITH CEMENT.

The "Compact Five"



The "Compact Five" transmitter is the top unit, with the various controls marked [illegible] correspond with the schematic diagram on [illegible] 96. The pilot light under the switch SW1 lights when the high voltage switch SW3 is turned [illegible] The bot-[illegible] unit is the "RF-5" receiver, described in detail in [illegible] November, 1939 issue of MECHANIX ILLUSTRATED. The U-shaped wooden frame enables the entire station equipment [illegible] be placed on a small table.

by Howard G. McEntee, W2FHP

THE "Compact Five" is [illegible] 5-meter transmitter designed to act [illegible] a companion to the "RF5" receiver described in the November issue. The two units form a modern amateur radio station with which [illegible] good number of pleasant contacts may be made. The transmitter is entirely self-contained and all power supply and modulation equipment is in the 9"x11"x15" case.

A 6N7, V1, serves as a crystal oscillator tube and also as [illegible] doubler. The output of the second section is capacitively coupled to the 807 final amplifier. The 75 ma. meter M1 may be shifted to read plate current in either section of V1 by means of the toggle switch SW1 in the center of the panel. The 150 ma. meter, M2, is permanently in the plate lead of the 807.

The latter tube has an unusual output circuit. A double stator tuning condenser C9 and a double section coil L3 are employed. There are two main reasons for this. The first is that the circuit as shown minimizes the effect of the rather high output capacity of the 807 upon the coil. This means that a larger effective inductance may be used than would be the case were a conventional single ended coil circuit employed. Secondly, the spit coil makes possible the use of a true balanced output circuit for connection to a matched impedance transmission line. Admittedly the circuit looks a bit unusual, but it gives much better results than does a single ended coil.

A control on the front panel allows change of coupling without digging into the cabinet. It is of the utmost convenience. The antenna coupling coil L4 is swung through the field between the plate coil sections. Its ends are connected through flexible leads to the feed through insulators on the front panel.

The audio system is quite simple and consists of three 6N7's. The first, V4, is used as a two-stage, resistance-coupled amplifier, the second, V5, [illegible] a Class A driver, coupled to a third 6N7, V6, as [illegible] Class B modulator. Both T1 and T2 are universal type transformers, connections for which are shown on the diagram.

A 150 ohm resistor, R15, in the cathode of the modulator, keeps the static plate current down within the tube rating for plate dissipation.

Careful filtering is required in the audio system, particularly in the first tube, as the layout is necessarily compact, and ultra high frequency R.F. has a way of getting in just where it is not wanted.

The microphone input circuit is completely shielded; the jack is of the enclosed type, and the R.F. choke RFC5 and by-pass condenser C11 are in shields bent up from tin.

A heavy busbar of copper runs the whole length of the chassis and all grounded components are soldered to this rather than to the chassis or to other grounded points. All such leads must be short and direct, particularly in the first audio tube V4 and in the R.F. section.

The regular sequence of construction is followed. First lay out all holes to be cut in the chassis, from the drawings and from close observation of the illustrations. When the chassis holes are all cut, continue to the panel and repeat the process.

The bottom of the case comes with a lip bent up all along the front edge. Were this piece left on, it would be necessary to space the panel from the chassis $\frac{1}{16}''$ or so, leading to many complications. The simplest procedure is to remove it with a hacksaw.

Wiring is started with all filament and other A.C. leads, after which the power supply is connected. The two filter condensers, C18, C19, are of the oil-filled type, mounted on an aluminum bracket under the chassis so that the top of the latter will be a bit less crowded.

Next wire the panel switches. One section of the high voltage switch, SW3, turns on a red pilot lamp when the power is on. The illuminated meters serve as a pilot to tell when the A.C. is on.

The tuning condensers for oscillator and doubler, C2 and C3, are mounted on their integral brackets to the chassis and insulated therefrom by means of a pair of butt-in insulators for each. Be sure the plate of the tube goes to the stator plates of each of these condensers.

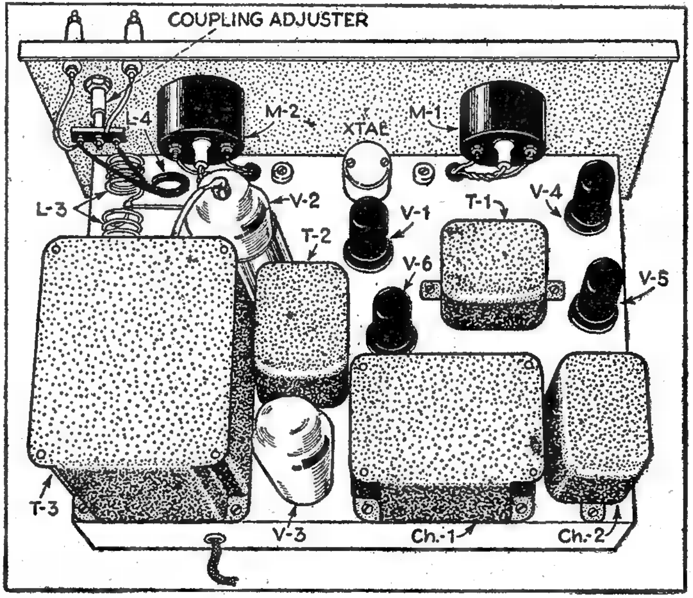
The final amplifier condenser C9 is simply held in place with a single screw through a hole in the base.

The coils for oscillator and doubler, L1 and L2, connect directly to the condenser terminals and are supported by them. The final amplifier coils L3 are supported by three insulating posts, and the coupling coil is held by a strip of Victron on the rear of the panel shaft.

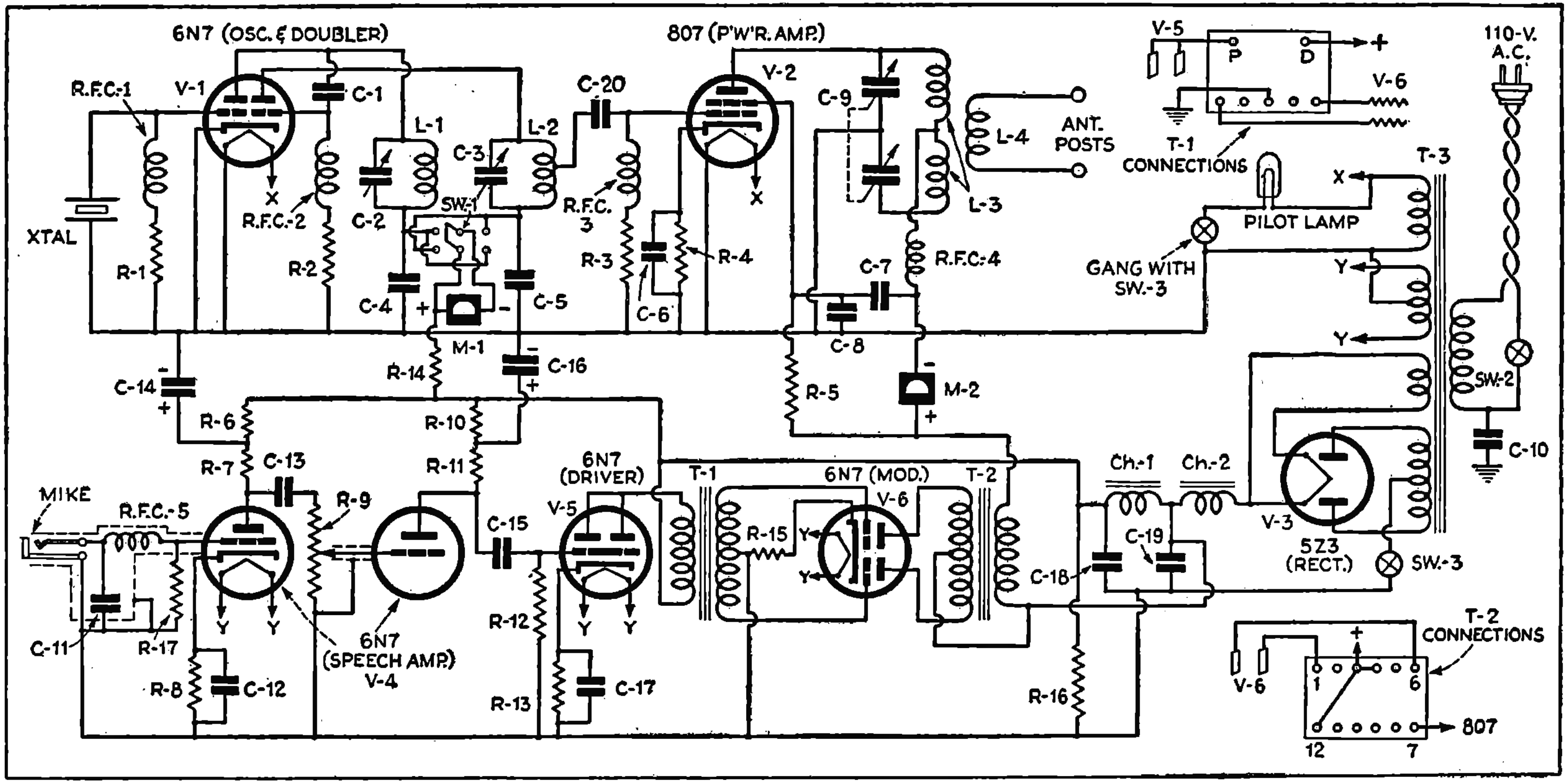
Preliminary tuning should be done with the grid of the A.F. tube grounded. A shorted phone plug will accomplish this. If this grid is left open, R.F. feedback will ensue. Rotation of the oscillator condenser, C2, will cause a flicker in the plate meter when the crystal oscillates. Next, rotate the doubler condenser, C3, until the final amplifier plate current rises sharply. The 807 plate current should dip down between 20 and 30 ma. when the associated condenser, C9, is tuned to resonance.

The plate voltage should be between 425 and 450 volts and the highest taps on the secondary of T3 are used. It is desirable at first to experiment thoroughly with the set using the lower voltage terminals before applying full power.

A fairly sensitive microphone is needed for modulation. Before testing the A.F. channel, connect a 25-watt Mazda bulb to the output terminals and vary the coupling coil until the 807 draws 70 ma. plate current. Then speak closely into the mike and note if the lamp gets a bit brighter on modulation. If

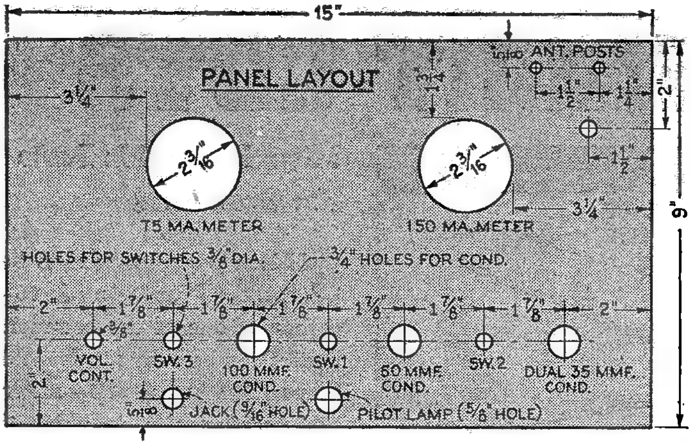


Back view of the "Compact Five" transmitter. Practically all the wiring is on the underside of the chassis.


6N7 (OSC. & DOUBLER)
807 (P'W'R. AMP.)
R.F.C.-1
V-1
C-1
L-1
C-3
L-2
C-20
V-2
C-9
L-4
ANT. POSTS
L-3
XTAL
X
R.F.C.-2
C-2
SW.-1
R.F.C. 3
R-1
R-2
C-4
M-1
C-5
R-3
R-4
C-6
C-7
R.F.C.-4
C-8
R-5
M-2
C-14
R-14
C-16
R-6
R-10
R-7
C-13
R-9
R-11
MIKE
R.F.C.-5
6N7 (DRIVER)
V-5
C-15
6N7 (MOD.)
V-6
T-1
T-2
R-15
Y
C-11
R-17
R-8
C-12
6N7 (SPEECH AMP.)
V-4
R-12
R-13
C-17
C-18
C-19
Ch.-1
Ch.-2
V-3
5Z3 (RECT.)
SW.-3
R-16
V-5
P
D
+
V-6
T-1 CONNECTIONS
PILOT LAMP
GANG WITH SW.-3
T-3
110-V. A.C.
SW.-2
C-10
T-2 CONNECTIONS
1
6
12
7
807

PARTS LIST

Antenna—Five meter Q (Johnson SQ)
1 2" feeder insulators (as needed, Johnson 132)
T1—Input transformer (U.T.C. S[illegible])
T2—Modulation transformer (U.T.C. S19)
T3—Power transformer (U.T.C. S40)
CH1—Choke (U.T.C. S28)
CH2—Choke (U.T.C. S32)
One each—807 tube, 5Z3 tube (R.C.A)
4—6N7 tubes (R.C.A.)
M1—75 [illegible] meter (Triplett 227A, rear illumination)
M2—150 ma. meter (Trip[illegible] 227A, [illegible] illumination)
1—Case 9" [illegible] 11" x 15" (Par-Metal HC9151)
1—Chassis [illegible] fit (Par-Metal C4524)
4—Dials (Crowe 294)
1—Knob (Crowe 591)
XTAL—10 meter crystal in holder (Bliley HF2)
1—Pilot lamp holder (Drake 205)
R1—7,000 ohm, ½ W. resistor (I.R.C. BT 1)
[illegible] R3—20,000 ohm, ½ [illegible] resistor (I.R.C. [illegible] 1)
R4—300 ohm, 10 W. wire wound resistor (I.R.C. AB)
R5—30,000 ohm, 10 [illegible] wire wound resistor (I.R.C. AB)
R6, [illegible],000 ohm, ½ W. resistor (I.R.C. [illegible] ½)
R7, R11—.25 meg ohm, ½ [illegible] resistor (I.R.C. BT ½)
R8—3,000 ohm, ½ W. resistor (I.R.C. BT ½)
R9—.5 meg. variable resistor (I.R.C. 13-133)
R12—.5 meg ohm, ½ [illegible] resistor (I.R.C. BT ½)
R13—1,000 ohm, ½ W. resistor (I.R.C. [illegible] 1)
R14—1,000 ohm, 10 W. wire wound resistor (I.R.C. AB)
R15—150 ohm, 10 W. wire wound resistor (I.R.C. [illegible]
R16—100,000 ohm, 25 W. wire wound resistor (I.R.C. [illegible]
R17—.5 [illegible] ohm, ½ W. resistor (I.R.C. BT ½)
R.F.C.4—High frequency choke (Insuline 1645[illegible]
1—Shielded jack (Insuline 1913)
1—Shielded plug (Insuline [illegible])
SW1—D.P.D.T. toggle switch (Insuline 1365)
SW2—S.P.S.T. toggle switch (Insuline 1230)
SW3—D.P.S.T. toggle switch (Insuline 1238)
1—Doz. grommets (Insuline 5124[illegible]
6—Terminal strips (Insuline 243[illegible])
2—Feed through insulators (Insuline [illegible]
1—Panel bushing (Insuline 1248)
Spaghetti, as needed
1—5 prong steatite socket (Amphenol RSS5)
1—8 prong steatite socket (Amphenol RSS8)
3—8 prong Bakelite socket (Amphenol MIP8)
1—4 prong Bakelite socket (Amphenol MI[illegible]
1—Crystal socket (Hammarlund [illegible]
C2—100mmf. variable condenser (Hammarlund HF100)
C3—50 mmf. variable condenser (Hammarlund HF50)
C9—Dual variable condenser (Hammarlund [illegible] 35SX)
3—pairs insulators (Hammarlund FTB)
3—Insulators (Hammarlund SOS-100)
R.F.C.1, R.F.C.2, R.F.C.3, R.F.C.5—2.5 mh. chokes (Hammarlund CHX)
1—Tube shield (Hammarlund PTS)
C1—100 mmf. [illegible] condensers (Cornell-Dubilier 5W5T1)
C4, C5, C6—.005 mf. mica condensers (Cornell-Dubilier 1W5D5)
C7, C8—.004 mf. mica condensers (Cornell-Dubilier 46D4)
C10, C13, C15—.01 mf. paper condensers (Cornell-Dubilier DT6S1)
C11, C20—50 mmf. mica condensers (Cornell-Dubilier [illegible]
C12, C17—25 mf. electrolytic condensers (Cornell-Dubilier BR102A)
C14, C16—8 mf. electrolytic condensers (Cornell-Dubilier BR845)
C18, C19—4 mf. paper filter condensers (Cornell-Dubilier TLA6040)
L1—5¾ turns No. [illegible] tinned copper wire, spaced ⅞" long, ⅝" I. D.
L2—3¾ turns No. 14 tinned [illegible] wire, spaced 1" long, ⅝" I. D.
Tap [illegible] turn from plate end
L3—Each section [illegible] turns No. [illegible] wire, spaced ¾" long, ⅞" I. D.
L4—4 turns No. [illegible] pushback wire, bunched together


15"
PANEL LAYOUT
3¼"
2 3/16"
2 3/16"
ANT. POSTS
1½"
1¼"
2"
1½"
3¼"
9"
75 MA. METER
150 MA. METER
HOLES FOR SWITCHES 3/8" DIA.
3/4" HOLES FOR COND.
2"
1 7/8"
1 7/8"
1 7/8"
1 7/8"
1 7/8"
1 7/8"
2"
3/8"
VOL. CONT.
SW. 3
100 MMF. COND.
SW. 1
50 MMF. COND.
SW. 2
DUAL 35 MMF. COND.
2"
JACK (5/16" HOLE)
PILOT LAMP (5/8" HOLE)

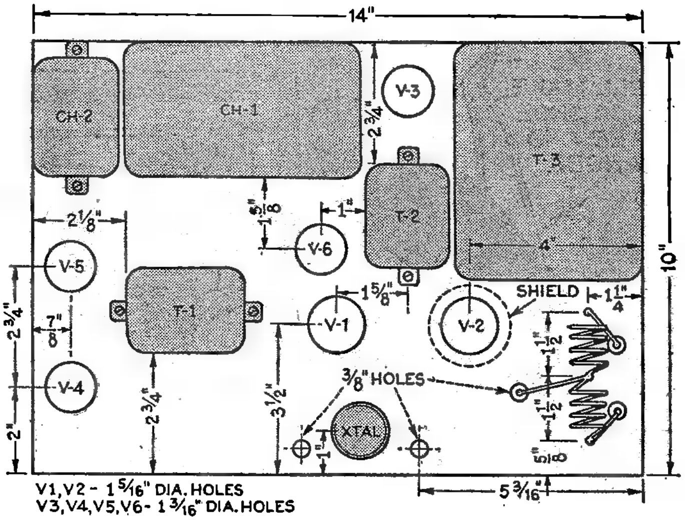
not, vary the tuning of the *doubler* and a point will be found when proper upward modulation occurs. This condenser varies the grid drive on the 807 and is the only critical adjustment to be made.

Although conditions will cause some variation, the following circuit values may be of interest: with 425 volts plate supply, both sections of the V1 will draw about 25 ma. when the crystal is oscillating, and 15 or so when it is not. The final amplifier draws about 60 ma. without drive (crystal out of socket), 90 ma. with full drive, but not tuned to resonance, and should drop to somewhere near 25 ma. at resonance and unloaded. It should not be loaded higher than 75 ma.

The set was designed for use with a matched impedance feeder line. A spacing of two inches between feeders is ample and makes for convenience in installation. The antenna chosen for this set is a Johnson Q, picked because it can be installed by the average amateur with the least possible trouble, and because it is highly efficient. The antenna may be used either vertically or horizontally, but the former is usually preferred as it gives more even radiation and a lower angle of radiation.

If such an antenna is used, it will give exceptionally fine receiving results as well. A porcelain base double-pole double-throw switch may be used to change from transmit to receive.

The best possible ground connection should be made to the chassis to minimize stray R.F. current. A short, heavy lead to a water pipe is ideal. It should be understood that a government license is *absolutely necessary to operate* this outfit. Failure to get both operator and station licenses makes the operator liable to a heavy fine. However, the requirements for amateur licenses are rather simple. Examinations are held periodically in many cities by examiners of the Federal Communications Commission. Any citizen of the United States, regardless of age, is eligible to apply. There is no fee or charge of any kind.

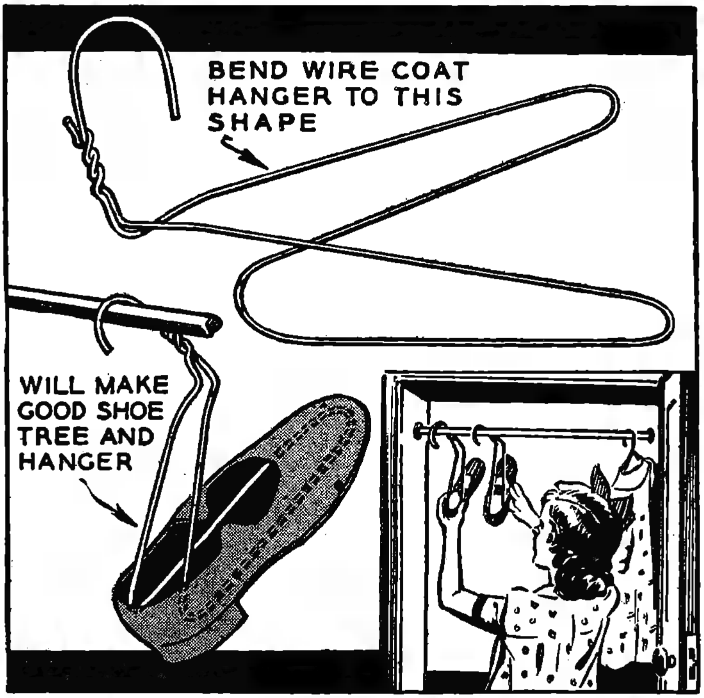

14"
CH-2
CH-1
V-3
2¾"
T-3
T-2
1 5/8"
1"
2 1/8"
V-6
4"
10"
V-5
T-1
1 5/8"
SHIELD
1¼"
V-1
V-2
7/8"
2¾"
V-4
2¾"
3½"
3/8" HOLES
1½"
1½"
1"
XTAL
2"
1"
5 3/16"
V1, V2 - 1 5/16" DIA. HOLES
V3, V4, V5, V6 - 1 3/16" DIA. HOLES

Panel and chassis layouts. The dimensions given should be followed carefully if the various parts indicated on the opposite page are used.

Complete and detailed information on the subject of amateur licenses is contained in an excellent little booklet entitled "The Radio Amateur's License Manual." This costs only 25 cents a copy, and is sold by all amateur supply houses. As a convenience to its readers, MECHANIX ILLUSTRATED will be glad to supply this booklet by mail at no extra cost.

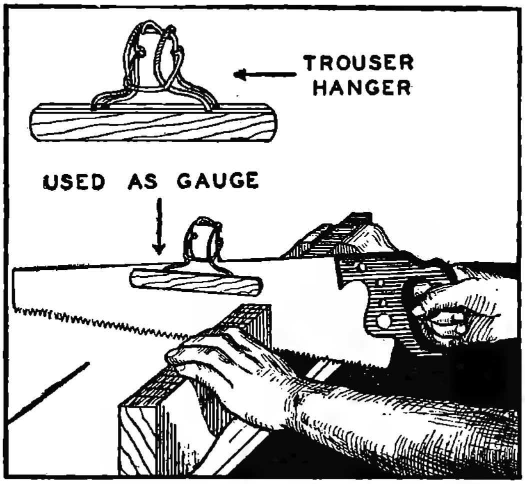
If you are interested in "going on the air" as a radio "ham," you will find the answers to many of your questions in this valuable publication. Please write your name and full post-office address clearly. Don't send coins through the mail; the easiest way to remit this small amount is by stamps. Send your request to Fawcett Publications, Inc., Dept. AR, Fawcett Building, Greenwich, Conn.

SHOP SHORT-CUTS


BEND WIRE COAT HANGER TO THIS SHAPE
WILL MAKE GOOD SHOE TREE AND HANGER

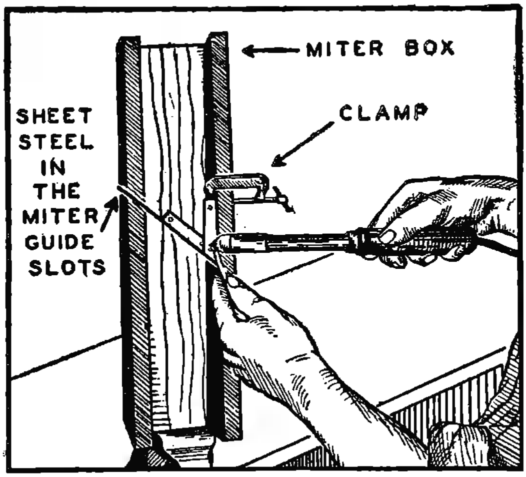
Simple Shoe Tree

AN ORDINARY wire coat hanger such as those carried by the five and ten cent stores can be easily bent to form an efficient shoe tree. Bend to the shape shown above. It will hold the shoe to shape nicely and permit air to circulate freely around the shoe when damp.—*Bertina Gernsback.*


TROUSER HANGER
USED AS GAUGE

Miter Box Holds Parts For Soldering

SMALL parts that are to be soldered or glued together at one of the common angles can be very nicely held in position in the shop miter box, saving the trouble of making special jigs for clamping the work. Use a sheet of stiff sheet steel in the miter guide slots at the angle required and use this sheet as one clamping surface, one side of the box forming the other surface. C clamps hold the parts to the surfaces while the work is being done. Illustration below shows the procedure clearly.—*W. C. Wilhite.*

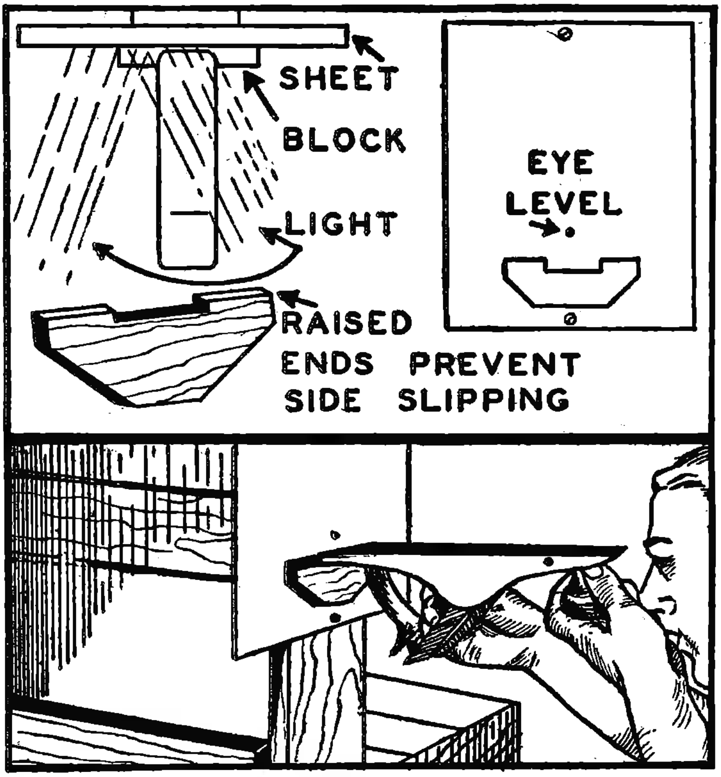

MITER BOX
CLAMP
SHEET STEEL IN THE MITER GUIDE SLOTS

Hanger Makes Depth Gauge

CLAMPED tightly to your hand saw in the position desired, an ordinary trousers hanger serves nicely as a gauge to stop the cut at any predetermined depth. A clamp of this type cannot be used as a gauge for very shallow cuts on saws of the usual dimensions; but for the deeper cuts as used in rafter and framing work such a gauge is ideal.—W. C. W.

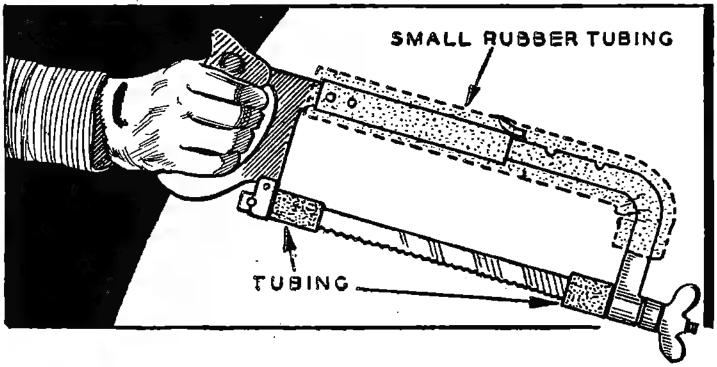
Wall Support Aids In Setting Planes

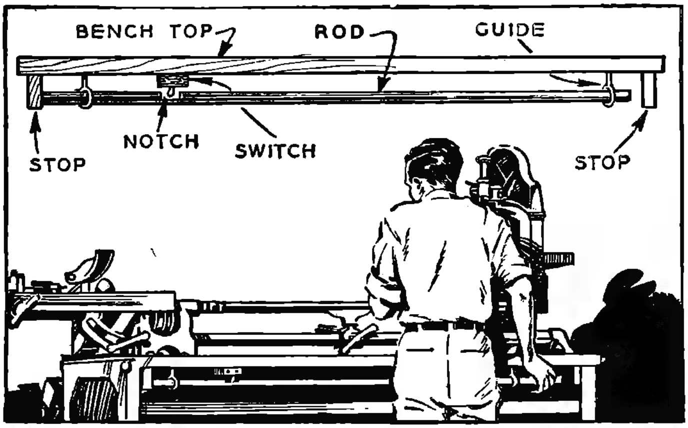
A WALL rack like the one shown will prove useful to the home shopman or the professional carpenter who uses long hand planes extensively. It consists of a small wooden block attached with screws to a light colored sheet of wall board about 9x12-in. in size. This sheet is fastened to the shop wall with the top of the block just under eye level and in such a place that considerable light from a window strikes the sheet. To use the device, place the heel of the inverted plane on the block and hold up the front end with the left hand. Sight along the plane and work the cutter adjustments until the proper depth is attained and the edge is straight.—*W. C. W.*


SHEET
BLOCK
LIGHT
EYE LEVEL
RAISED ENDS PREVENT SIDE SLIPPING

Rubber Tubes Prevent Marring

WHEN sawing nickel-plated tubing with the hack saw, or other similar work which must not be blemished, follow the stunt shown in the sketch. Any small rubber tubing will do —even a couple of pieces of ½-in. garden hose.—*D. V. H.*





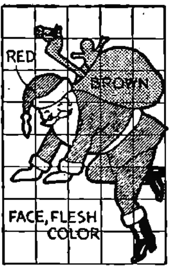
Simple Safety Switch

WHEN two or more pieces of home workshop equipment are run by one motor a switch is needed that can be readily reached. Toggle switch is placed at the front of the bench, just underneath. A long wooden rod is run through guides, with stops at each end and a notch to fit over the switch. Reach underneath and turn off the power from any position.—*W. F. M.*

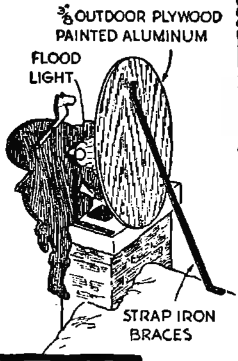
CUT-OUTS FOR CHRISTMAS

BRIGHTLY colored silhouettes, set up in the snow in front of the house and illuminated by flood lights concealed behind shrubbery, add a gay touch to the holiday scene. These can be scroll-sawed from outdoor plywood of ¼-in. or ⅜-in. thickness, and

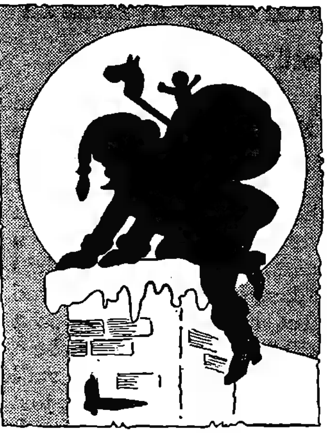
[*Continued on page* 142]


RED
BROWN
FACE, FLESH COLOR

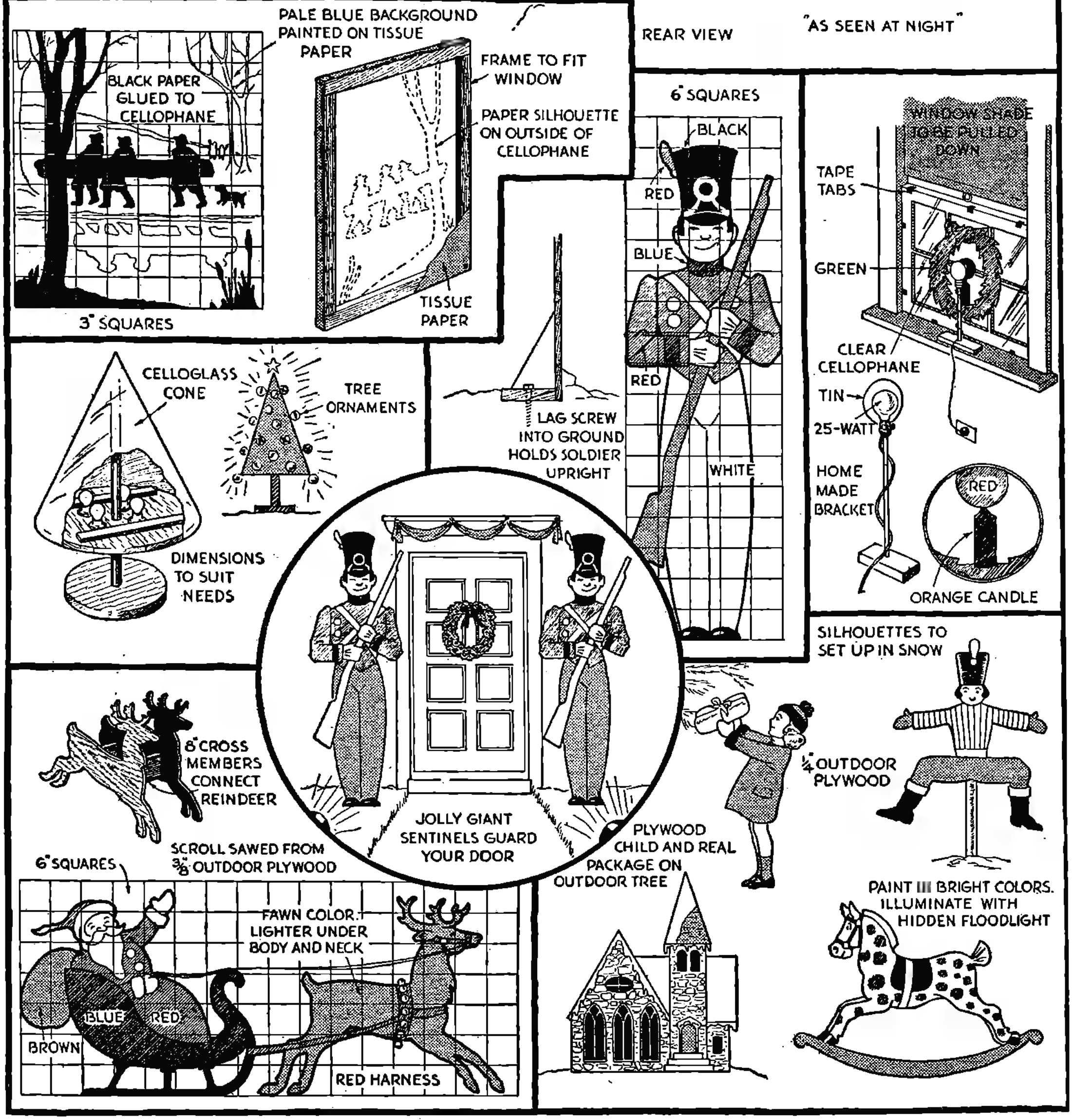
SAWED FROM 3/8 OUTDOOR PLYWOOD


3/8 OUTDOOR PLYWOOD PAINTED ALUMINUM
FLOOD LIGHT
STRAP IRON BRACES

REAR VIEW



"AS SEEN AT NIGHT"


BLACK PAPER GLUED TO CELLOPHANE
3" SQUARES
PALE BLUE BACKGROUND PAINTED ON TISSUE PAPER
FRAME TO FIT WINDOW
PAPER SILHOUETTE ON OUTSIDE OF CELLOPHANE
TISSUE PAPER
6" SQUARES
BLACK
RED
BLUE
RED
WHITE
WINDOW SHADE TO BE PULLED DOWN
TAPE TABS
GREEN
CLEAR CELLOPHANE
TIN
25-WATT
HOME MADE BRACKET
RED
ORANGE CANDLE
CELLOGLASS CONE
TREE ORNAMENTS
DIMENSIONS TO SUIT NEEDS
LAG SCREW INTO GROUND HOLDS SOLDIER UPRIGHT
JOLLY GIANT SENTINELS GUARD YOUR DOOR
SILHOUETTES TO SET UP IN SNOW
1/4 OUTDOOR PLYWOOD
PLYWOOD CHILD AND REAL PACKAGE ON OUTDOOR TREE
8" CROSS MEMBERS CONNECT REINDEER
SCROLL SAWED FROM 3/8 OUTDOOR PLYWOOD
6" SQUARES
FAWN COLOR: LIGHTER UNDER BODY AND NECK
BLUE
RED
BROWN
RED HARNESS
PAINT IN BRIGHT COLORS. ILLUMINATE WITH HIDDEN FLOODLIGHT

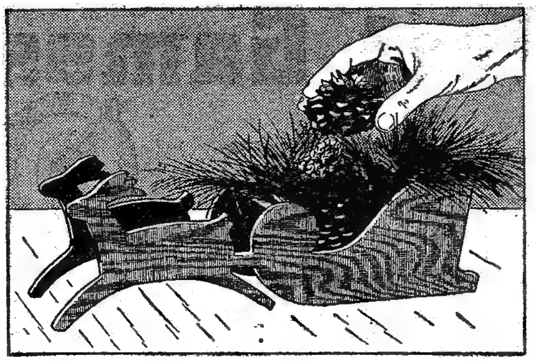


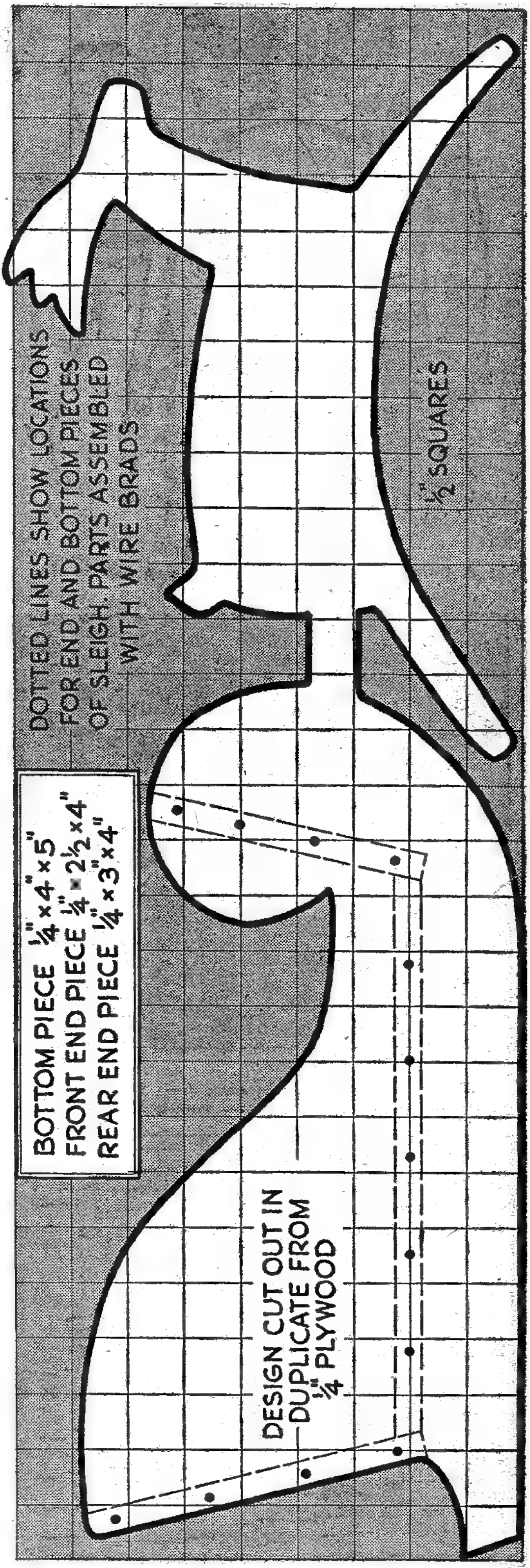
Photo [redacted] page 80.

Jigsawed REINDEER SLEIGH

TWO dashing reindeer attached to [redacted] sleigh make up this most unusual and attractive centerpiece for the Christmas holiday season. It may be used very effectively [redacted] [redacted] table decoration filled with clusters of pine needles and cones or it will serve as a container for small Christmas toys or candy.

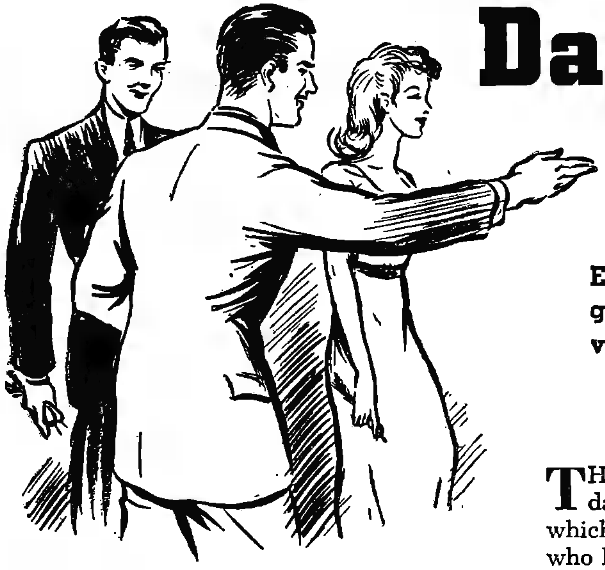
The design for the two sides of the reindeer sleigh, which are duplicates, are cut from two pieces of ¼-in. plywood. First, prepare a full size outline of the design by sketching it on a piece of heavy paper on which ½-in. squares have been drawn. Cut this out as a template for outlining the design on a piece of plywood. Then, if [redacted] second piece of plywood is tacked on the under side of the one that contains the outline, both sections may be sawed out at one time. The two ends and bottom for the sleigh are also cut out from ¼-in. plywood. Use the grain on the plywood to the best advantage in creating the illusion of action to the deer and the side of the sleigh. Notice the effective grain design in the reindeer sleigh photograph. Smooth off all the edges and assemble the several parts with wire brads. Stain the entire design with a light oak stain to bring out the pleasing grain on the plywood. Finally, paint with several coats of clear varnish or lacquer, and rub down to a dull finish, if preferred, with fine steel wool.—*George A. Smith.*

Next month's issue of MECHANIX ILLUSTRATED will contain more interesting Christmas projects, so be [redacted] not to miss it. Also featured will be a 50-in. gas powered scale model of the Westland *Lysander*, famous army cooperation ship of Britain's R. A. F.


DOTTED LINES SHOW LOCATIONS FOR END AND BOTTOM PIECES OF SLEIGH. PARTS ASSEMBLED WITH WIRE BRADS
½" SQUARES
BOTTOM PIECE ¼"×4"×5"
FRONT END PIECE ¼" [redacted] 2½"×4"
REAR END PIECE ¼"×3"×4"
DESIGN CUT OUT IN DUPLICATE FROM ¼" PLYWOOD

Lay out the pattern at right in half inch squares on paper. This is then used as [redacted] guide in cutting the plywood sides.

Dart Games



A little practice will develop amazing skill in this enjoyable pastime.

Easy-to-make dart games that will provide fun for the family and friends.

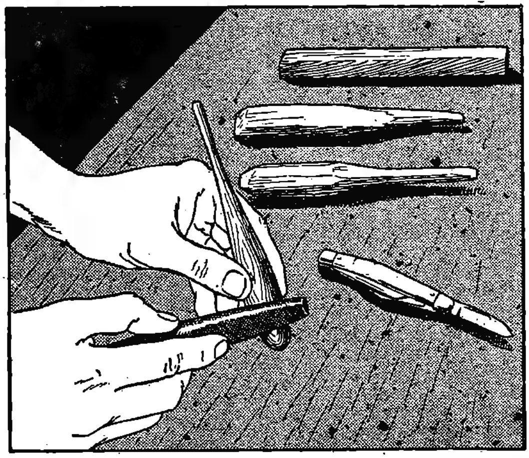
by Ray J. Marran

THROWING a steel pointed, feather tipped dart at a target is fun: fascinating fun, which seems to draw the interest of everyone who hefts one of these small missiles and has [redacted] target of some sort available at which to throw the dart.

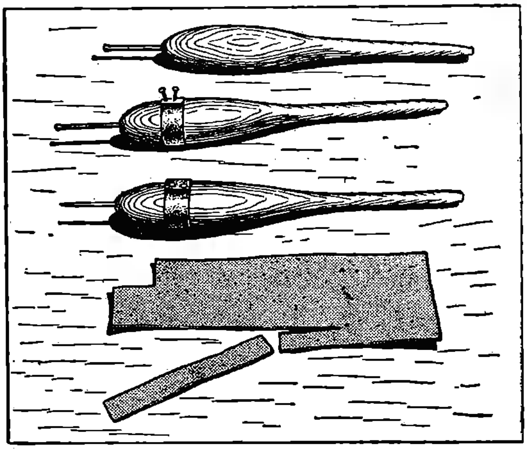
The fascination in dart throwing lies in the skill required to throw the dart, so that it will hit where it was aimed. This skill, [redacted] in all games of the tossing and throwing type, must be acquired by practice and by the development of one's own individual technique.

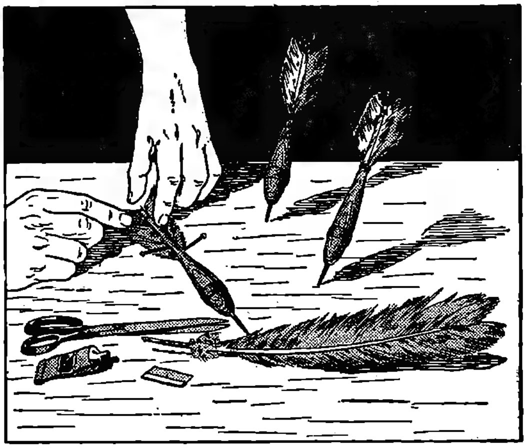
The popularity of dart throwing games is rapidly increasing, due to the fact that games of this type may be made at home, and because they may be played indoors or outdoors by one person alone, or by a group of persons, individually or in teams, [redacted] competitive contests.

The fun derived in playing dart games is unlimited, for once started, the fascination of



Whittle the bodies of the darts from hard or soft wood, then smooth with wood rasp and sandpaper.





Point dart heads with finishing nails filed to needle points, then tack narrow bands of sheet lead around body for weight. Tails are then feathered with four 3-in. sections of feathers held [redacted] place with glue.

For Winter Evenings

throwing darts rapidly increases and soon becomes a source of diversion that will provide hours of entertainment for any "difficult to entertain" group of house guests. Try dart games on your recreation room guests and see how true this target fascination applies to them. The equipment necessary will consist of six or more darts and a target board installed on a wall or easel, daring the person gazing into its "bull's-eye," to pick up a dart and "hit me if you can."

THE DARTS

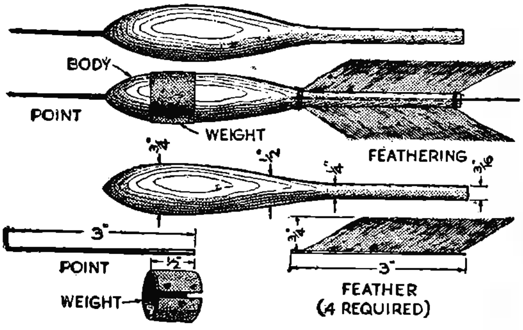
The darts used in the games suggested may be made at home very easily with hand tools alone, or they may be turned on the lathe.

An inexpensive dart, suitable for home use, should be 6 inches long, carved from hard wood, so that the oval forebody is ¾ of an inch in diameter by 3 inches long and tapers to a 3 inch tail stem, on which are glued four 3 inch sections of feathers. The point is good quality steel inserted in the body head, then sharpened to a needle point. The forebody of the dart is weighted with a band of lead.

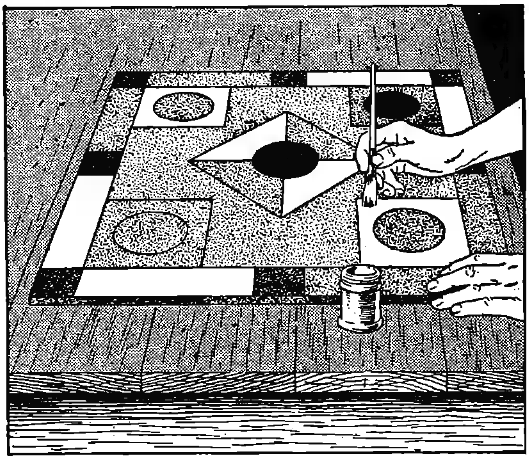
The darts may be lathe turned to the dimensions shown on the sketch, or they may be whittled to shape with a pocket knife.

Use straight grained wood for the body. Pine, redwood, cedar, cypress or fir if the body is to be hand whittled. Ash, walnut or maple if the body is to be lathe turned.

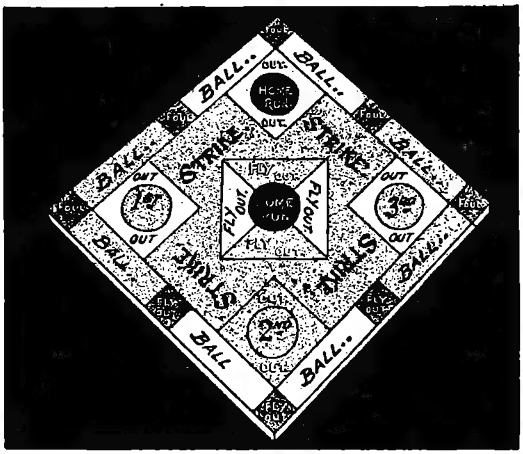
The points may be made from 3 inch sections of steel knitting needles, or from a headless 6-penny finishing nail. Insert the points in tight fitting holes drilled in the body head, then sharpen to a needle point with file and sandstone.



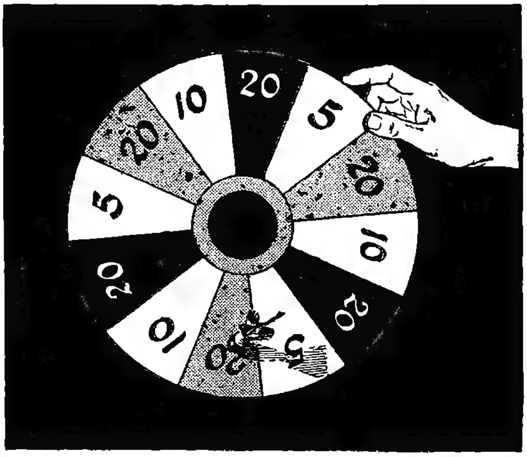
Sketch shows component parts of darts and how they are assembled.

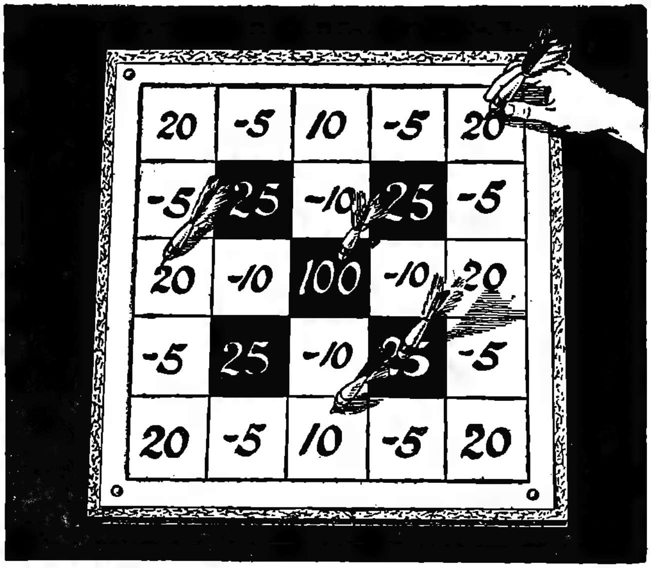


Above is layout for baseball game and below, the finished board.

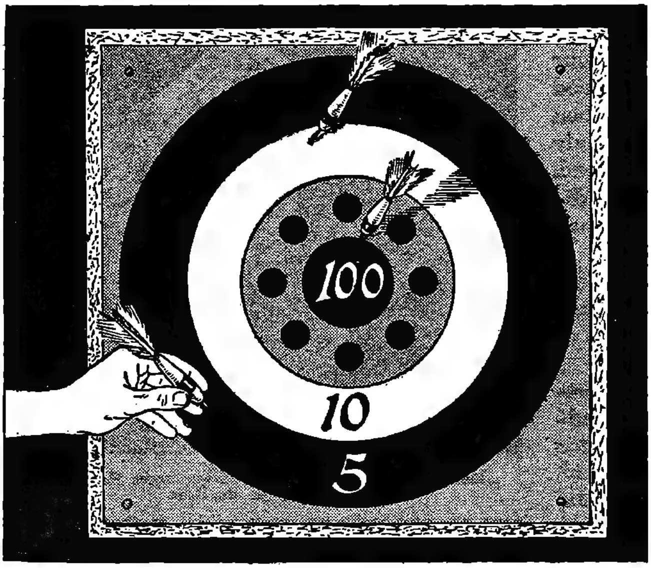


Design for the V section Bull's-eye target (below) is described in the text.





Plus and minus target.



Dart pool.

A ½-inch band of sheet lead provides the weight. Hold this band to the wood with brads. Such as cigar box nails.

The feathers are 3-inch sections of turkey tail or other feathers and are held in a cross-like arrangement on the tail stem with glue and a thread wrapping at both ends of the feather stems.

Make at least twelve darts for the games suggested. Paint the body part of the darts with distinguishing colors of quick drying enamel, red, green, blue, yellow, or band combinations of these colors.

THE TARGET

The design for a dart game target is drawn with a soft pencil, ruler and compass on a 24-inch square of loose fibre wall board. Paint the different sections of the target design with show card paint, or with quick drying enamel. Outline the colored sections with black. Letter the playing instructions or the scoring points with a small brush dipped in black or white showcard paint. Many interesting games and combinations are possible with the targets, and descriptions of some of the best ones follow.

Dart Poker—The target used for playing poker with feathered darts is made by gluing a full 52-card pack of old playing cards on a 24-inch square of wallboard in a shuffled arrangement. This target is then attached to the easel backboard and each player is furnished five darts. Each player throws his five darts in turn. First throw of the five darts represents the player's hand. The player may remove any or all of the darts for his "draw," after which he re-throws the withdrawn darts to fill his hand, trying, of course to hit the cards that will give him the highest ranking poker combination. A dart hitting exactly on a line between the cards does not count and should be rethrown.

Dart Baseball—This game is played with the target illustrated. Any number of persons may compete, each player representing a team. Players stand 15 feet in front of the target and throw darts until they make three outs. Each turn counts as an inning, and nine innings make the game, as in real baseball. The object of the game is, of course, to score the greatest number of runs in the nine innings. Regular baseball rules apply. A dart hitting inside a Home Run section scores 1 point. Base runs are made by the dart landing inside the 1st, 2nd and 3rd base sections. Men on bases are advanced according to play and score 1 point on being advanced to Home.

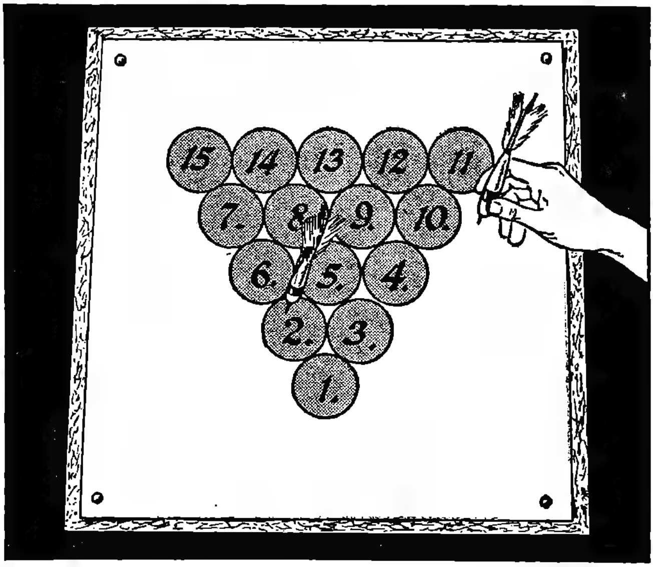
V Section Bull's-Eye Target—Draw this

design, consisting of 12 V shaped sections and a center bull's-eye on a round 18-inch disc as shown, then paint with show card color. Number the V sections 5, 10 and 20. Center bull's-eye represents 100. The players, armed with three darts, stand 15 feet in front of the target and throw in rotation. High score at the end of ten rounds wins.

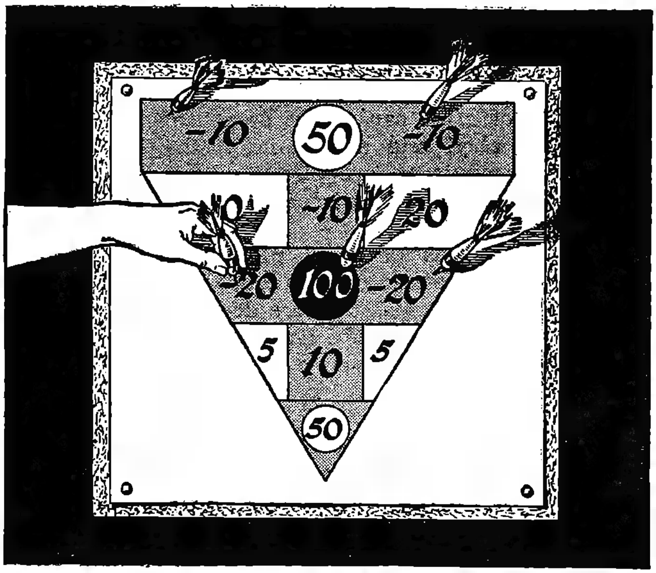
Plus and Minus Target—The sections in this target provide an uncertain outcome for the players' scores because darts hitting in the minus sections may put a player "in the hole" instead of increasing his score. Each player uses five darts and has ten turns.

Dart Pool—The fifteen circles in this design represent fifteen racked billiard balls which must be hit consecutively. Each player throws one dart each turn and aims the first throw to hit circle No. 1. If he is successful he throws at circle No. 2, etc. If he misses the "ball" at which he aims, the next player throws. "Balls" hit in proper order are considered pocketed by the player hitting them. High score is figured from the numbers on the pocketed "balls."

Dart Crokinole—This game provides the player with a target divided into only three sections in which points may be scored. Design represents the layout of a crokinole board and is drawn on a 24-inch square of wall board with a string compass. Black dots in the section around the bull's eye are merely added for ornamentation and no score is registered if this section is hit. Three darts for each player and ten turns.



Dart crokinole.



Dart shuffleboard.

Dart Shuffleboard—An adaptation of the design of a shuffleboard court provides an interesting target. Paint the design on a 24-in. square of wallboard and number as illustrated. Players throw five darts each in rotation from a point 15 feet in front of the target. High score after ten turns wins.

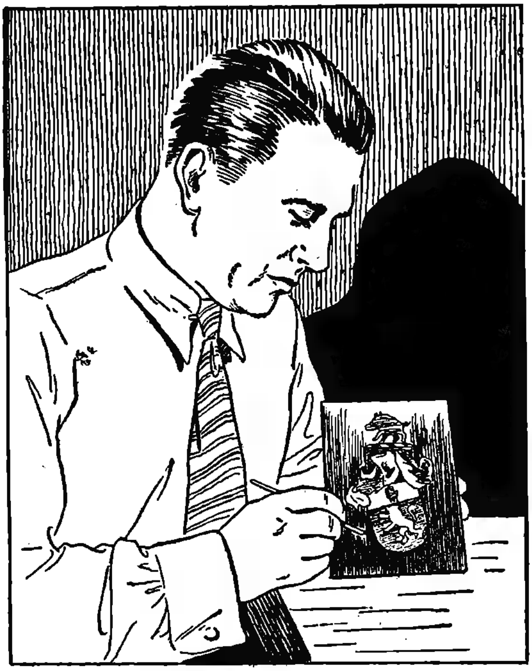
TO THROW A DART

Hold the dart between thumb and forefinger, on or near the front of the lead weight ring. Raise the forearm, by bending the elbow, so that the dart is about level with the ear, then with a quick, forward snap of the arm, release the dart for the throw.

Good aim, a snappy throw and just the right amount of power behind the throw carries the dart to the spot on the target at which it was aimed. This technique is gained by experience and practice, and the fun obtained is well worth the time spent in making and installing a series of dart games in the yard, or in a recreation room.

COAT OF ARMS In Colored Clay

by Paul McGinnis



Inexpensive and easy [illegible] work, modelling clay is ideal for your [illegible] of arms.

A COAT of arms can easily be made of colored clay, and should interest the many Americans who are discovering that their families can now be traced back hundreds of years.

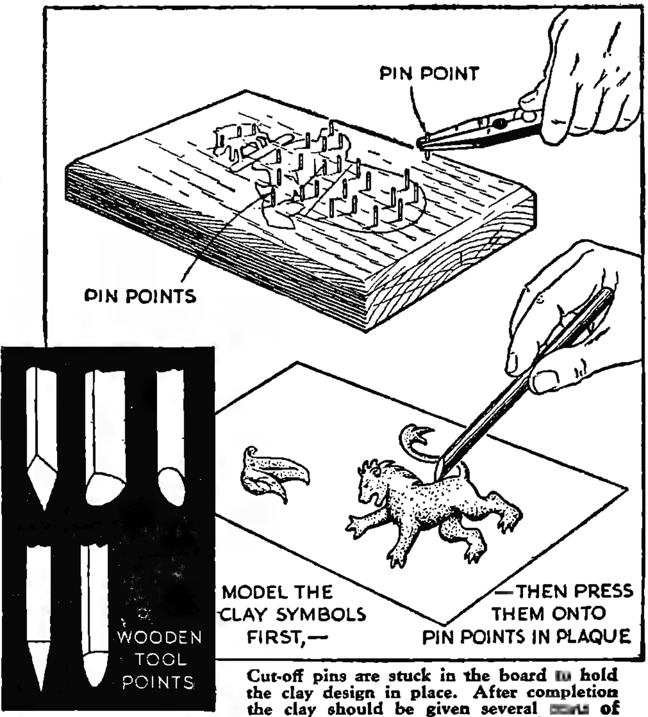
Colored clay has beautiful pastel shades and it can be painted with ordinary gold and silver paint where desired. It is suitable for the amateur sculptor because mistakes can be readily changed whereas in wood carving a mistake sometimes spoils the work and it must be started again. When anchored to a wooden plaque with pins and varnished, [illegible] clay coat of arms can be preserved indefinitely as a wall ornament.

The science of genealogy has developed rapidly in recent years and available records have increased [illegible] that most of the large city libraries have departments devoted to it. Here you will sometimes find thousands of books tracing lineage back to Feudal days and many Americans are being surprised at finding their own families accurately recorded and extending back into antiquity. It sometimes happens that an unsuspecting person will take down a book bearing his family name and find his own grandfather mentioned in it.

The name whose coat of arms is shown in the accompanying picture is traced back through a line of Spanish kings to 1699 B. C. One of these kings, Milesius, sent eight sons with [illegible] expedition to the British Isles in 541 B. C. One direct descendant became king of Ireland and founder of the family name. These records were in Gaelic, one of the oldest of languages. Such interesting information is free in any large library.

Books of heraldry give the designs for coats of arms and crests, describing in strange old language the position of symbols and their colors. Burke's standard works on this describe the accompanying coat of arms this way: "Vert, [illegible] lion rampant, or. On a chief argent a dexter hand, gules." This means, "On a green shield a lion standing on his hind legs, gold. On the top of the shield, which is silver, [illegible] right hand, red." There

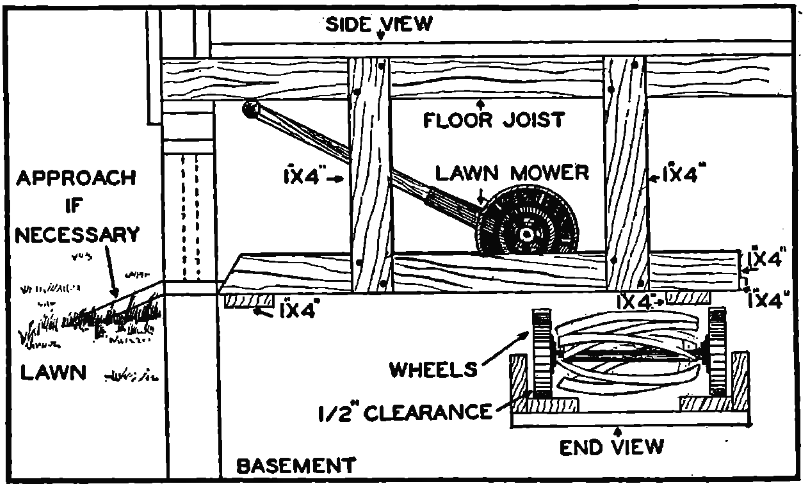
[*Continued on page* 143]



PIN POINT
PIN POINTS
WOODEN TOOL POINTS
MODEL THE CLAY SYMBOLS FIRST,—
—THEN PRESS THEM ONTO PIN POINTS IN PLAQUE

Cut-off pins are stuck in the board [illegible] hold the clay design in place. After completion the clay should be given several [illegible] of clear varnish as [illegible] preservative.

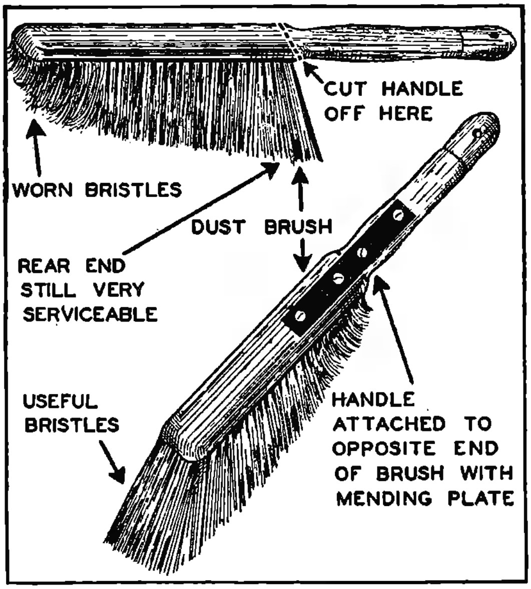
Storing The Lawn Mower


SIDE VIEW
FLOOR JOIST
APPROACH IF NECESSARY
1X4"
LAWN MOWER
1X4"
1X4"
1X4"
1X4"
1X4"
LAWN
WHEELS
1/2" CLEARANCE
END VIEW
BASEMENT

MANY people in suburban homes have no really convenient place to store the lawn mower. There is room ahead of the car in the garage, but lots of times the car must be removed first to get it out. Carrying it up and down the basement steps is out of the question when it is needed for use almost daily.

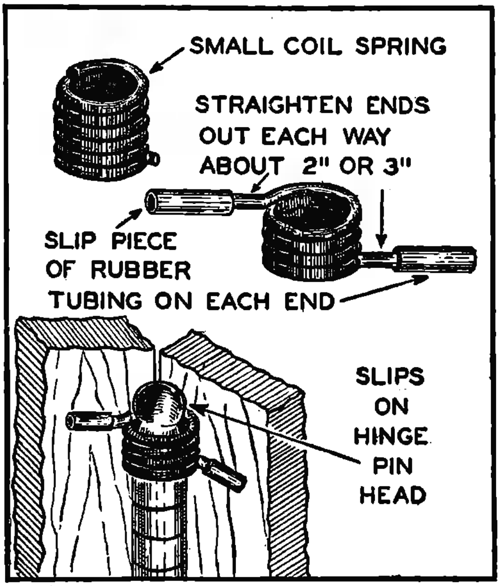
The storage shown solves the problem. This is a simple frame, built adjoining one of the basement windows and extending out into the basement space just below the first floor joists. All of the material can be 1x4-in. stuff. The two tracks are made from two pieces 8 feet long nailed together at right angles. Cleats underneath space them just wide enough to permit the mower wheels to roll along with ¼-in. to spare on each side.

These tracks are then suspended from the joists with one end held tight against the inside edge of the window sill. The window is opened and propped from the inside, then the mower is pushed through the window and along the track far enough for the window to be closed again.—*Dale Van Horn.*


CUT HANDLE OFF HERE
WORN BRISTLES
DUST BRUSH
REAR END STILL VERY SERVICEABLE
USEFUL BRISTLES
HANDLE ATTACHED TO OPPOSITE END OF BRUSH WITH MENDING PLATE

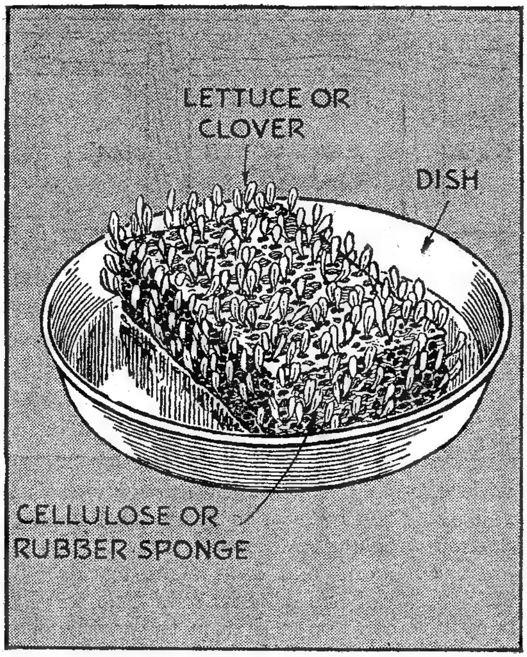
Renewing Worn Dust Brush

WHEN dust brushes are discarded it's usually because the "business end" is worn down. To get maximum service from such brushes the handle may be cut off and attached to the opposite end of the brush body with a mending plate as shown.—*A. Vena.*

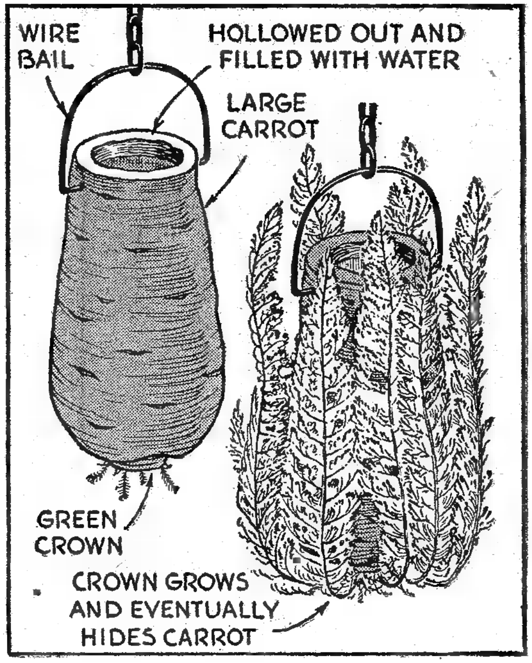

SMALL COIL SPRING
STRAIGHTEN ENDS OUT EACH WAY ABOUT 2" OR 3"
SLIP PIECE OF RUBBER TUBING ON EACH END
SLIPS ON HINGE PIN HEAD

Simple Door Spring

A VERY effective method of making a door self-closing is as follows: get a stiff spring and shape as shown above. Slip a scrap of small tubing or radio "spaghetti" on each spring then place the coil on the door hinge pin.—*A. H. W.*


LETTUCE OR CLOVER
DISH
CELLULOSE OR RUBBER SPONGE

Whoever heard of lettuce growing out of a sponge! But it does.


WIRE BAIL
HOLLOWED OUT AND FILLED WITH WATER
LARGE CARROT
GREEN CROWN
CROWN GROWS AND EVENTUALLY HIDES CARROT

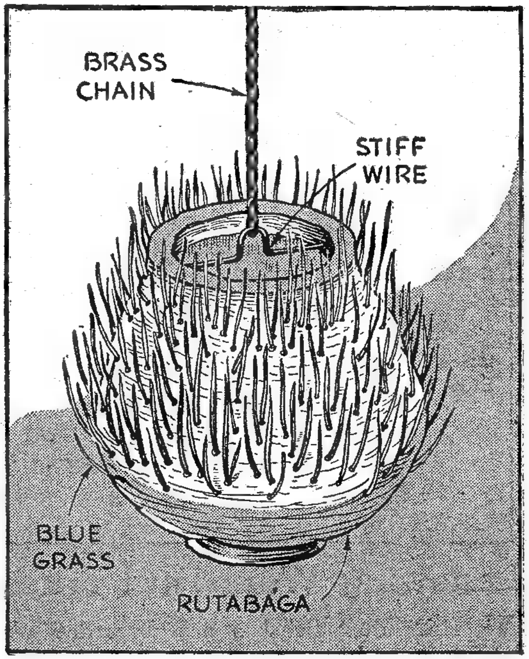
Hanging carrot ferns liven up drab windows.

NOVELTY PLANTS

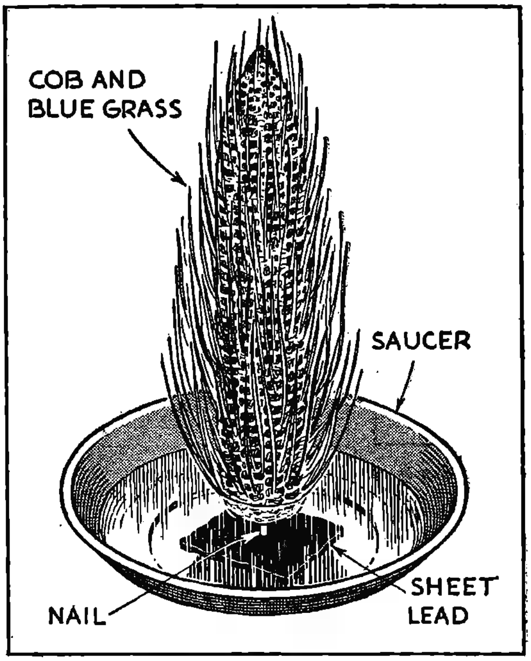
NOVELTY winter plantings will add charm to your home and cause favorable comment from friends. None of them requires much expense, all are easily produced. These trick plantings may be started any time this winter. If you have an indoor flower garden or the sun room well given over to plants, you might give some of these oddities a corner by themselves.

Sponge and Lettuce: Wet a cellulose or rubber sponge and work lettuce or clover seed into some of the pores. Place this in a shallow dish which has a little water in the bottom. Leave it in a warm place for several days until the seeds begin to sprout. Then place it on the window sill or other sunny location, and with plenty water kept in the dish, the seedlings will grow fast! In time they will cover the sponge. You may trim the tips of the plants if you wish, to keep the shape regular.

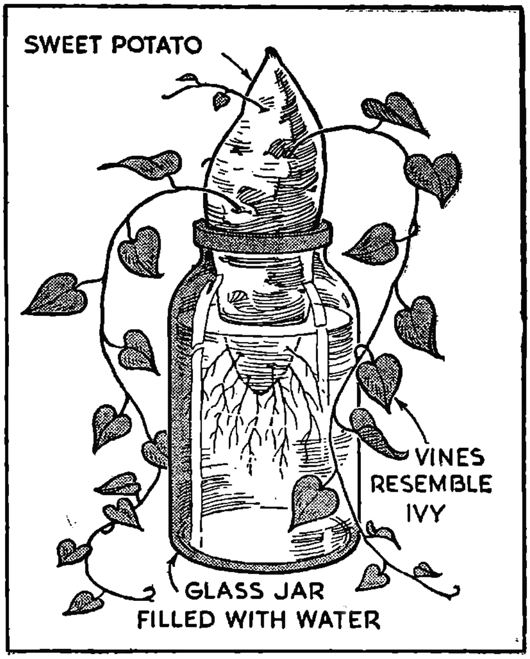
Hanging Carrot Plant: This is a dandy. Obtain as large a carrot as possible and cut off the root up where it is an inch or more in diameter. Throw the root away. Hollow out the body of the carrot with a sharp knife to make a reservoir. Bend a wire to form a bail and push the bent over ends into the carrot near the top with the crown at the bottom. Keep this well filled with water. To do so you will have to add water every day for it will drink a great deal. For about a week, nothing will happen. Then, all of a sudden, the crown will start to send out shoots


BRASS CHAIN
STIFF WIRE
BLUE GRASS
RUTABAGA

A plant from Mars can be made with Kentucky blue grass and rutabaga.

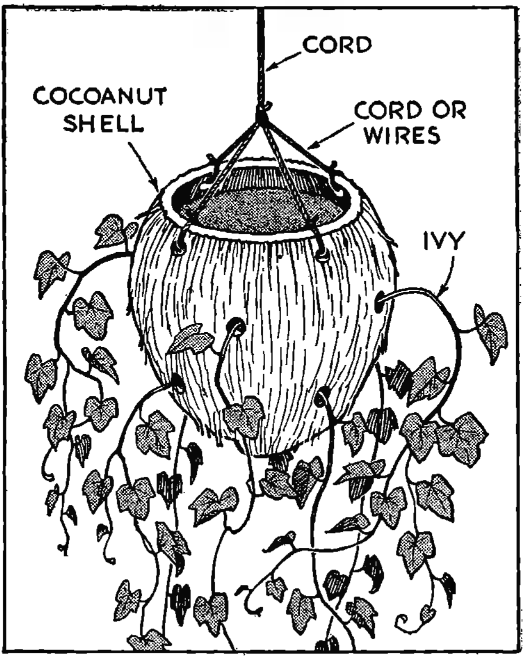


Not a Christmas tree, but a corn cob planted with blue grass.



Sweet potato in a jar of water sprouts a handsome vine.

FOR INDOORS



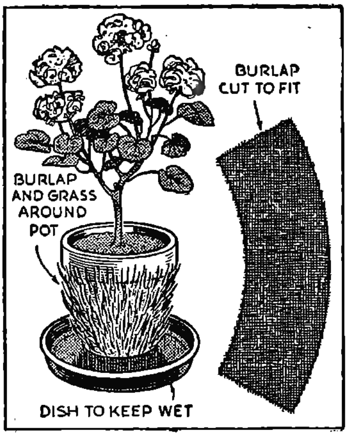
Cocoanut shells are excellent ivy baskets.

which may grow as much as a half inch or more a day. As the growth continues, the shoots begin to curve up all around the carrot and if kept in a warm place, will eventually extend up past the top of the root. Carrot shoots have fine lacy fronds, resembling a fern, and make an ideal hanging plant for beside the window. You can hook a brass chain to the wire bail and hang it wherever desired.

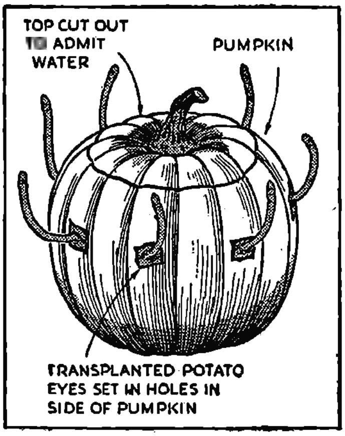
Cob and Bluegrass: After this one gets into full stride you will have what at first glance, appears to be a miniature cedar. Drive a nail through a square of sheet lead, push the nail up into the end of a cob and set the whole arrangement in a dish filled with water. In a few hours the cob is well soaked. Then sprinkle blue grass seed over it thoroughly so that one or more seeds catch in each of the depressions in the cob. Leave it undisturbed and after a week or so the seeds sprout, take root, and grow well. Trimming here too, will help to get the desired effect—in fact you can trim it Christmas tree shape or however you choose. There's plenty of food for the plants in the cob, which will soon be hidden.

Sweet Potato Vines: This is an old favorite but belongs with these others. The sweet potato should be large enough to not quite slip down into the neck of the jar, so that part of the tuber will be exposed as shown. The vines very closely resemble ivy. Quick growing, they will add that much to be desired touch of green to any corner.

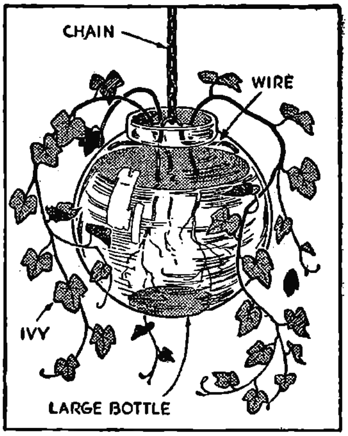
Rutabaga and Bluegrass: Hollow out an



Clothe that ugly flower pot in soft green grass.


TOP CUT OUT [redacted] ADMIT WATER
PUMPKIN
TRANSPLANTED POTATO EYES SET IN HOLES IN SIDE OF PUMPKIN

The result of potato eyes peering from portholes in a pumpkin.



Ivy in a [redacted] bottle makes another attractive hanging plant.

large [redacted] rutabaga as you can find, cutting out the crown. Hang it with a stiff wire and chain, then make a number of small holes [redacted] little way into the side all the way around. Into each hole push a bluegrass seed. The holes should be quite close together. An alternate plan is to punch larger holes, place from [redacted] to 12 seeds in each hole and space these holes about 1 inch apart. As long as the center of the rutabaga is kept filled with water it won't spoil.

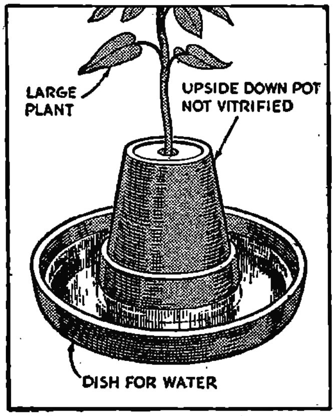
Cocoanut and Ivy: Saw off one end of a cocoanut, leaving at least two-thirds of the shell intact. Scoop out the meat. Bore 4 evenly spaced, small holes around the top and into these, tie cords which are knotted about 3 inches above the opening. Bore other holes through the shell—about 8 for the whole unit. Work the roots of a small ivy plant through each hole and carefuly sift in rich earth, packing it rather firmly. This continues up to within about 1 inch of the top. Keep the filling moist and watch the ivy grow. This makes another ideal novelty hanging plant and may even be hung from the lights over the dining table.

Bluegrass Covered Flower Pot: If you have ever said "I wish there was some way to hide the flower pot!" here's how. Cut a piece of burlap to fit snugly around the side of the pot, up to the rim, and stitch it in place. Moisten the cloth and rub grass seed into the pores. A piece of turkish towelling will do as well. Set the pot in a saucer and keep [redacted] little water here [redacted] that capillary attraction will keep the whole cloth wet. The grass will sprout and grow and this lush, green covering for the pot will give an added novelty to the plant growing in it.

Freak Pumpkin: Cut the top out of a quite small pie pumpkin and hollow it out by removing seeds and fibers. Leave the stem [redacted] for a handle. Make several small holes in the sides and carefully transplant into them the eyes from a potato or two. Keep the pumpkin filled with water and the eyes will grow, sending out regular potato shoots.

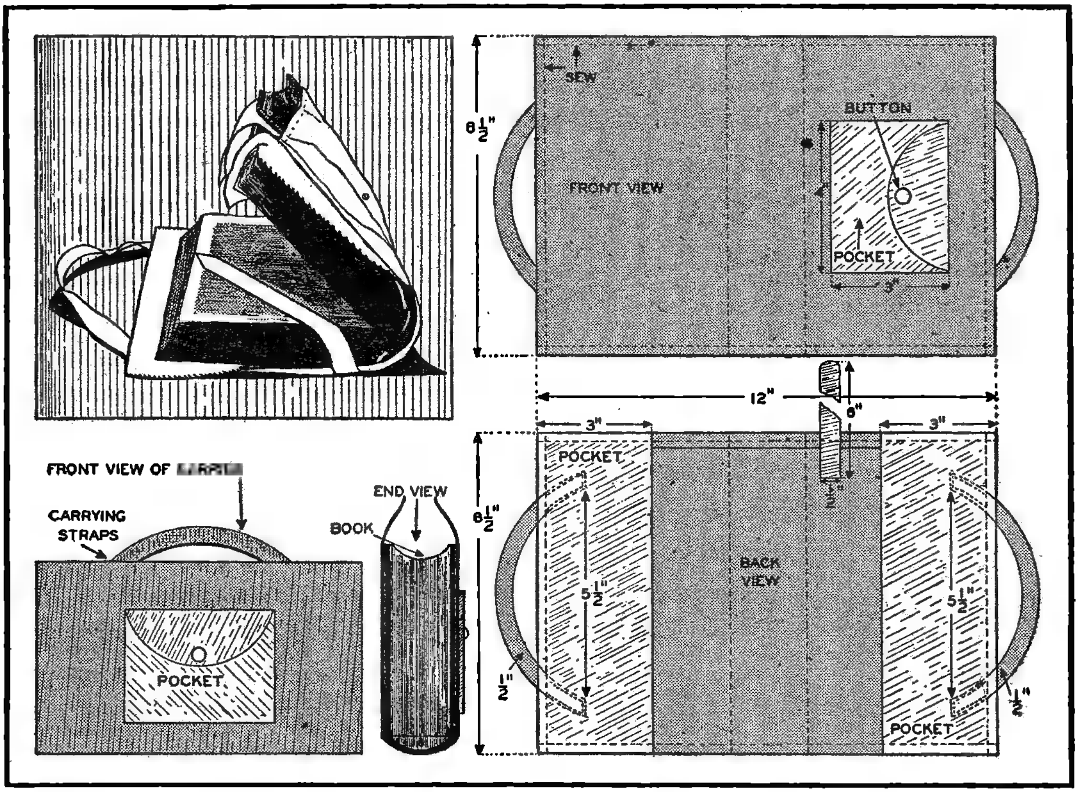
Bottled Ivy: Any fancy bottle of green or blue glass, will make a dandy hanging container for 2 or 3 ivy plants. The capacity of the bottle is secondary but it should hold a quart or more. Obtain [redacted] brass chain, bend a stiff wire to the shape shown and set it inside the bottle flat so it can come out, with the bottom link of the chain in the U bend. Put the ivy roots in the water, add a bit of plant food occasionally, and watch it grow. In [redacted] few weeks the bottle will be well filled with [redacted] tangle of roots while the ivy itself drapes down over the outside.

Trick Planting: Fill a small clay pot with rich soil and pack it firmly, clear to the brim. Turn it over in a dish and keep a little water showing around the rim all the time. Now push a grape fruit seed down into the hole in the pot and wait for it to come up through. Some other seed which suits your fancy will do just as well.

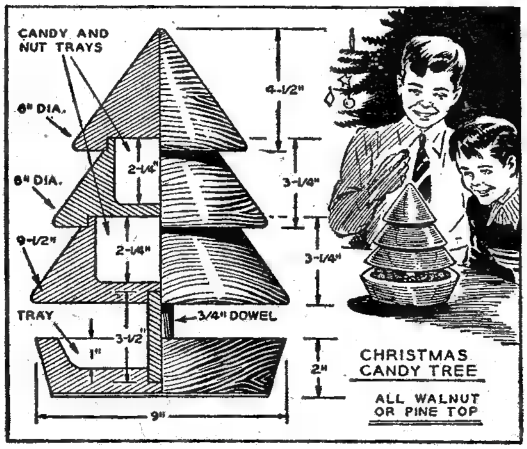

LARGE PLANT
UPSIDE DOWN POT NOT VITRIFIED
DISH FOR WATER

A grapefruit seed will produce [redacted] fine plant when [redacted] in the above manner.

Novel Book Cover and Carrier


SEW
BUTTON
FRONT VIEW
POCKET
3"
8½"
12"
6"
3"
3"
½"
POCKET
BACK VIEW
5½"
5½"
½"
½"
POCKET
FRONT VIEW OF CARRIER
CARRYING STRAPS
END VIEW
BOOK
8½"
POCKET

Christmas Candy Tree


CANDY AND NUT TRAYS
6" DIA.
8" DIA.
9-1/2"
4-1/2"
2-1/4"
3-1/4"
2-1/4"
3-1/4"
TRAY
3/4" DOWEL
3-1/2"
1"
2"
9"
CHRISTMAS CANDY TREE
ALL WALNUT OR PINE TOP

USE pine for the three blocks of the tree, or, if you wish, walnut or gumwood. The top block is turned down on the lathe to measure 6-in. in diameter by 4½-in. deep. The middle block or tray is 8-in. in diameter by

[*Continued on page* 143]

THIS little book cover and handy carrier will be found very useful and practical for the confirmed book lover who likes to carry her book on trips or outings.

It is simple in design and does away with the usual method of carrying the book under the arm. The side pocket will also be found very useful. In addition, the cover will protect the book from being soiled.

The cover can be made from any heavy material such as leatherette, oilcloth or heavy cotton or silk. If a light piece of cloth is used, it may be lined on the inside.

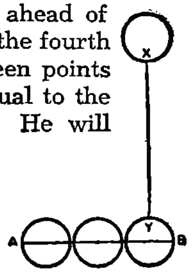
The material is laid out as shown and two side pockets added. The covers of the book slide into these side pockets. A small pocket, of the same material, is added to one side of the cover to carry handkerchiefs, money, pad, pencils, etc.

Two strips of material are sewn to the edges and serve as carrying straps. A narrow ornamental cotton or silk rope may be used for this purpose. The dimensions given on the plan are about right for the average book.—*H. R. Wallin.*

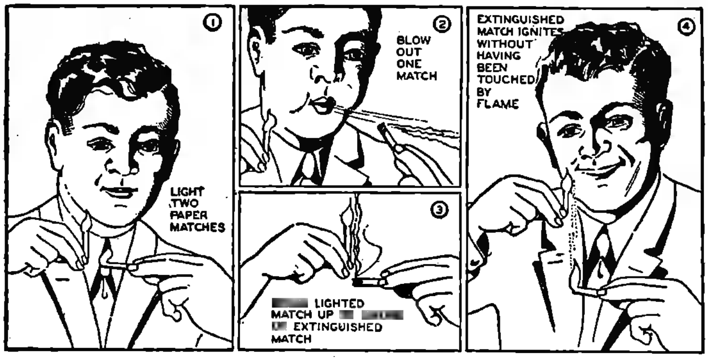
FOUR SIMPLE TRICKS

by Martin Gardner

SET three glasses in a row, brims down, and a fourth glass ahead of them. Ask someone to move the fourth glass until the distance between points X and Y is approximately equal to the distance between A and B. He will underestimate the distance AB by several inches! Drawing shows glasses correctly placed, although line XY appears longer than AB.

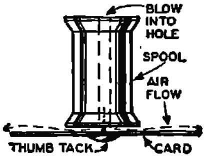


LIGHT two paper matches, holding [redacted] vertically in the right hand, and the other horizontally in the left, as shown. Blow out the match in the left hand, and quickly bring the other match to it, touching the head with the lower end of the lit match. The match in the left hand will immediately relight! This occurs because the smoke rising from the lower match contains an inflammable gas (produced by the wax near the head). The smoke rises past the flame of the lit match, with the result that the flame travels quickly down the smoke and lights the lower match. It appears as though it were relighted by the wrong end of the lighted match.


①
LIGHT TWO PAPER MATCHES
②
BLOW OUT ONE MATCH
③
[redacted] LIGHTED MATCH UP [redacted] [redacted] [redacted] EXTINGUISHED MATCH
④
EXTINGUISHED MATCH IGNITES WITHOUT HAVING BEEN TOUCHED BY FLAME

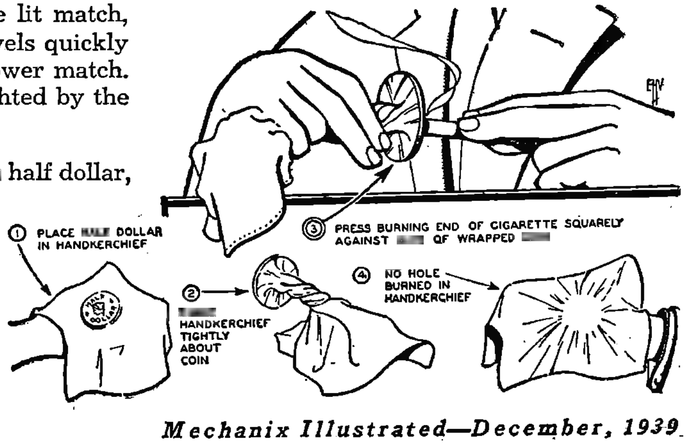
WITH [redacted] pocket handkerchief, [redacted] half dollar, and a burning cigarette can perform an unusual experiment illustrating the conductivity of heat. Twist the handkerchief tightly about the half dollar, then press the burning end of the cigarette squarely against the side of the wrapped coin. Because silver is an excellent conductor, the half dollar will absorb the heat [redacted] rapidly that it will not burn the cloth. You can hold the cigarette against the coin for several seconds without damaging the handkerchief! Demonstrate with [redacted] borrowed handkerchief and you can have some fun at the expense of the owner who expects to have his handkerchief ruined.

BERNOULLI'S principle, as scientists call it, has become extremely important in modern physics. It states that when air is in rapid motion past a stationary object, a low pressure area is created. For example, air rushing over the top of the wings of a plane creates [redacted] low pressure area above the wings. This suction causes the plane to rise, not the force of the air against the under sides of the wings [redacted] most people believe.


BLOW INTO HOLE
SPOOL
AIR FLOW
THUMB TACK
CARD

The principle can be demonstrated easily with a spool, a visiting card, and a thub tack. Push the tack through the center of the card, and place the spool on the card so that the hole goes over the point of the tack. By blowing vigorously through the other opening of the spool,

[*Continued on page* 145]


① PLACE [redacted] DOLLAR IN HANDKERCHIEF
② [redacted] HANDKERCHIEF TIGHTLY ABOUT COIN
③ PRESS BURNING END OF CIGARETTE SQUARELY AGAINST [redacted] OF WRAPPED [redacted]
④ NO HOLE BURNED IN HANDKERCHIEF

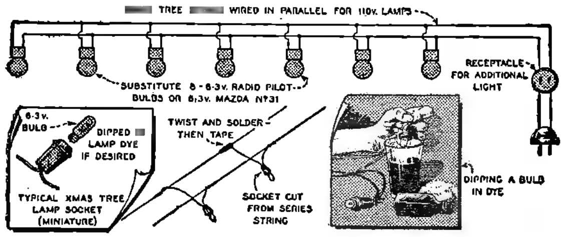
Battery Lighting For Christmas Trees

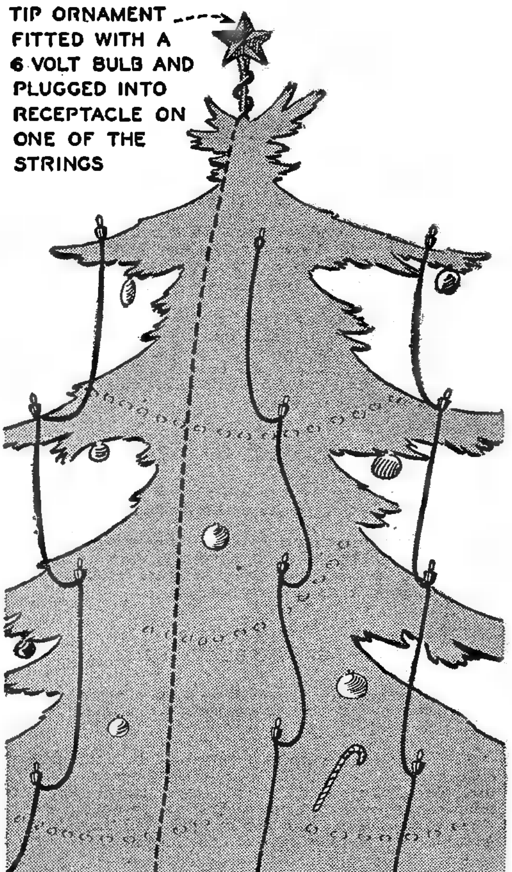
MANY are the rural homes still depending upon old style lamps for illumination. For this reason the celebration of Christmas and the illumination of the Christmas tree cannot be enhanced, by the many beautiful colored lights possible with the usual 110 volt lighting circuit. There is, however, a way of getting around this handicap—by lighting the tree from a 6 volt source; that of the common auto battery.

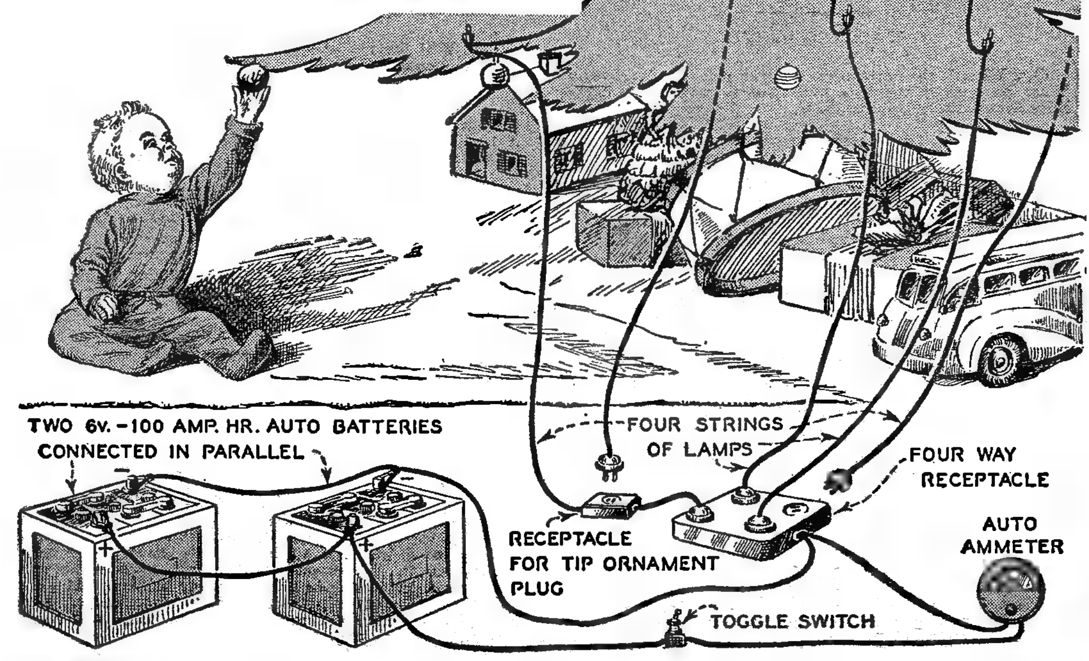
It is fair to assume that nearly every family owns a car, has access to a garage or has some means of charging the 6 volt storage battery. In such a case the tree can be beautifully illuminated and there will be no reason to envy the city or big town slickers. Here is the way to do it.

The usual tree can be nicely decorated with four strings of Christmas tree lights. These are the "series" strings in which eight 15 volt lamps are connected in series. Multiple strings are also made but their lamp sockets

[*Continued on page* 144]


[illegible] TREE [illegible] WIRED IN PARALLEL FOR 110V. LAMPS
SUBSTITUTE 8 - 6-3V. RADIO PILOT BULBS OR 6,3V. MAZDA Nº31
RECEPTACLE FOR ADDITIONAL LIGHT
6-3V. BULB
DIPPED [illegible] LAMP DYE IF DESIRED
TYPICAL XMAS TREE LAMP SOCKET (MINIATURE)
TWIST AND SOLDER THEN TAPE
SOCKET CUT FROM SERIES STRING
DIPPING A BULB IN DYE


TIP ORNAMENT FITTED WITH A 6 VOLT BULB AND PLUGGED INTO RECEPTACLE ON ONE OF THE STRINGS


TWO 6V.-100 AMP. HR. AUTO BATTERIES CONNECTED IN PARALLEL
FOUR STRINGS OF LAMPS
FOUR WAY RECEPTACLE
RECEPTACLE FOR TIP ORNAMENT PLUG
AUTO AMMETER
TOGGLE SWITCH

AMATEUR PHOTO PUZZLERS

INCOMPLETELY DEVELOPED FILM

Q. Lately, I developed some films and failed to fix them long enough with the result that they have a milky white appearance. Is there any way this condition [redacted] be corrected?—Fernand Leclaire, Montreal, Canada.

A. It is possible to correct the condition of the films by re-immersing them in water for five minutes and refixing in fresh hypo for at least 15 minutes. After refixing in hypo, the films should again be washed in clear running water for half [redacted] hour and then dried. This treatment will eliminate the white condition.

DEVELOPING RECEPTACLES

Q. Is it safe [redacted] develop and fix film and paper in aluminum ware—Richard Bushnell, Brattlesboro, Vt.

A. Neither developer, hypo nor any other photographic chemical should be handled in aluminum ware. Photo chemicals should be used only in glass, hard rubber, Bakelite, enameled [redacted] stainless steel receptacles.

GRAY NEGATIVES

Q. I notice that my negatives have a milky appearance when immersed in the fixing bath. Is this fog?—Worth White, Raleigh, N. C.

A. Negatives appear gray as viewed in a safelight when only partially developed. The milky appearance remains until the negative is immersed in hypo; clears up in several minutes. It is always advisable to cover up the negatives while in hypo for at least two minutes until they clear, after which there is less likelihood of their fogging.

WASHING PRINTS

Q. What is the correct way to wash prints and negatives? What happens [redacted] they are permitted [redacted] wash too long?—Billy Brandenburg, Elloree, S. C.

A. The life of prints and negatives practically depends on the washing process. It is the presence of sodium hyposulphite in the water that causes prints to fade and produces yellowness in the whites of the picture. There are [redacted] number of commercial washing tanks available from your photo dealer. Effective washing arrangements have been suggested in the various issues of Good Photography and Photography Handbook. Prints and negatives should be washed in clear running water whose temperature is the same as the developer and fixing bath. The water should circulate continuously—for best results—and if possible the water should be drained off from the bottom. Normal washing time for both prints and negatives is about 20 minutes at 65 degrees. Prolonged washing is liable to initiate a decomposition of the emulsion and is about as bad as not enough washing.

PIN HOLES IN BELLOWS

Q. I noticed several pin holes in the bellows of my camera. What should I do [redacted] eliminate them?—William C. Pogue, Bedford, Va.

A. If you [redacted] being bothered with holes in the bellows of your camera, it may be possible to eliminate them by covering with black tape. A special opaque coating is sold by photo dealers for the protection of bellows subject to cracking, and is frequently successful in preventing light leaks. If patching is impractical, the safest procedure is to replace the bellows if the camera model warrants the expense.

FILM AND PAPER DEVELOPER

Q. I have been developing my film [redacted] D-72 with reasonable [redacted]. But recently I [redacted] cautioned against using this developer for my film. Have I been following an undesirable practice?—Fred E. Dailey, Ladd, Ill.

A. It is perfectly safe to develop film in D-72 as well as to develop prints in this same developer. The practice is fairly common, although considered not especially desirable by those addicted to the "grain" complex, D-72 is recommended as [redacted] paper developer and is not [redacted] fine [redacted] grain-producing developer as D-76. For that reason it is not desirable for developing small film, especially 35-mm film. It is safe, however, for sizes above 2¼x2¼ inches. D-76 is a finer grain developer and results in less contrast than D-72. The preferred procedure is to develop negatives, both ortho and pan, in D-76 and paper in D-72.

NEGATIVE RETOUCHING

Q. What should be used [redacted] block out backgrounds and retouch on negatives?—Nick Meyo, Cleveland, Ohio.

A. Special opaques are sold by art stores and photo dealers for coating certain negative areas in order to block them out. India ink may also be used with success except that it cannot be removed. On the other hand, opaques are removable by washing without causing injury to the negative. Negative retouching may also be done with suitable soft and hard pencils especially made for this purpose, and available from photo dealers.

FILM HARDENING SOLUTION

Q. Will the use of an acid short-stop bath prevent film from scratching?—Herbert Meyer, Tulsa, Okla.

A. The function of an acid short-stop bath is to stop the action of developer residue remaining on the film after it has been removed from the developing tray. A short-stop bath acts as a rinse, not as a hardener. An effective film hardening solution may be prepared with Formalin [redacted] follows:

Formalin (40% formaldehyde solution)....	2½	drams
Sodium Carbonate	70	grains
Water to make	32	ozs.

Immerse film in this solution for three minutes, dip immediately in clear water and place in fixing bath for five minutes.

MATTE AND GLOSSY SURFACES

Q. How are matte and glossy surfaces obtained on different photographic papers?—Ronald Hewitt, Newark, New Jersey.

A. Different photographic papers are available from the manufacturer in matte, semi-matte, semi-gloss and glossy surfaces. In the case of matte and semi-matte papers, nothing need be done to obtain this surface—the paper already has it. Paper marked "glossy" needs to be ferrotyped in order to obtain [redacted] hard glossy surface. If glossy paper is not ferrotyped, it will dry with [redacted] semi-gloss. There are numerous other surfaces available in rough and smooth textures that are part of the paper itself.

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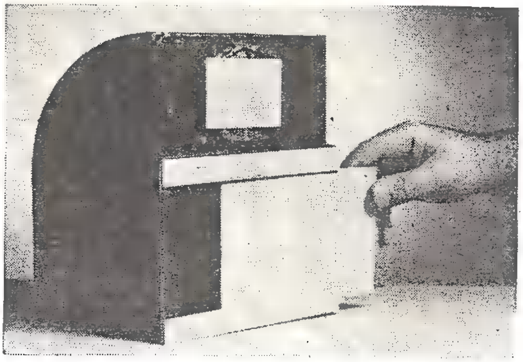
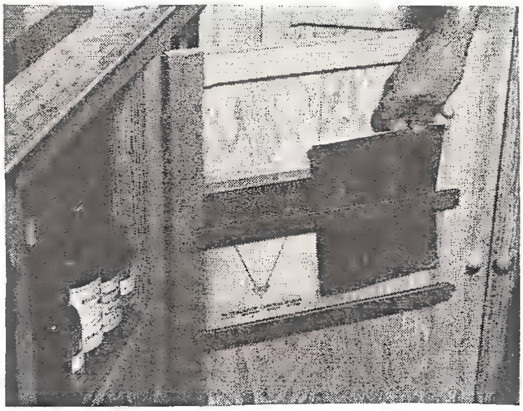
Darkroom Tricks for Photo Fans



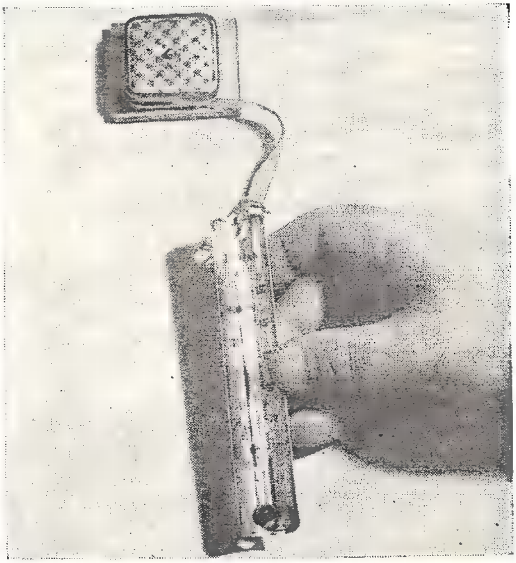
You can control safelight illumination with the above opaque shield. Cement two strips of cardboard above and below safelight window. Slide mask on this track.



Space for booklets inside cabinet doors is made by fastening two wood strips, the lower one rabbeted, as shown above. These "shelves" will hold booklets ready for use.

Coarse corrugated board, waterproofed with paraffine may be used for draining trays as shown above. Place the cardboard close to the wall to partly support trays.

Emergency developing trays for small strips of roll film may be used as shown above. These are glass or Bakelite soap dishes available in five and dime stores.



A spring measuring tape fastened to the wall over the developing bench makes thermometer handy, as shown above. When not in use, the tape readily winds up.

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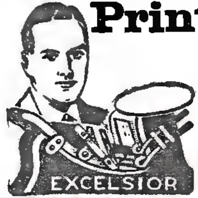

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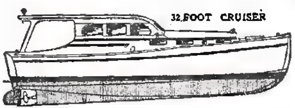

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Roads Should Be Planned With Normal Driver In Mind

A great deal of attention has been given lately to the accident-prone driver. Officials have worried over how to remove from the highways those motorists who seemed to act as catalyst in producing dangerous crashes.

Perhaps too much emphasis has been placed on the fact that certain individuals figure in more than their share of highway tragedies. For, after all, the great bulk of accidents do happen to the "normal" driver who has never before had a serious mishap and may never have another.

A recent survey of accidents in Connecticut made from Highway Research Board statistics by Dr. T. W. Forbes of Yale's Bureau for Street Traffic Research indicates that if all the drivers who had more than two accidents in a period of three years were to have been taken from the highway, the total accident record for the next three years would have been reduced by less than four per cent.

Highway engineers, Dr. Forbes urges, should devote their principal attention to the problems of the normal driver—the driver who is ordinarily cautious and ordinarily skillful.

Highways should be so planned that the normal driver can operate on them safely with his ordinary habits of driving.

"Capabilities which must be considered in connection with traffic design and control include such items as driver judgments in overtaking and passing cars so as to allow the driver sufficient time and distance for this maneuver," Dr. Forbes said in a report to the *Journal of General Psychology*; "the speed of driver reactions in connection with the placement of warning signs and the design of entrances and exits to high speed highways; visual characteristics of the driver in order to design signs which will be easily legible and which will give the driver time enough to act in the appropriate fashion; color and attention values in connection with the designs and placement of traffic signs and signals; and many other capacities which play a part in certain phases of the operation of the motor vehicle upon the highway."

For millions of years the world's early birds had teeth.

A synthetic plastic material for casting type is being used in Germany.

East Timbalier Island in the Gulf of Mexico has moved more than two miles in a hundred years.

A lunar rainbow is a much rarer sight than a rainbow produced by the sun.

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Are you prepared to demand the hidden facts of life? Will you continue to believe that you are not capable of weighing the worth of knowledge that concerns your personal freedom and happiness? Realize that much that can make your life more *understandable* and *livable* has been left unexplained or intentionally destroyed. At first by word of mouth only, and *now* by private discourses, are *revealed* those truths which secret brotherhoods preserved in ancient temples and hidden sanctuaries, from those who sought to selfishly deprive humanity of them.

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Pine Outyields Cotton As Cellulose Producer

King Cotton's possible abdication to Prince Pine in the South has been much talked of in a general way, since it has become a part of common public information that the shrub's white lint and the tree's white wood yield the same basic material, cellulose, used now in a score of industries, from textiles and transparent wrapping materials to molded plastics and automobile lacquers.

Definite quantitative status is now given, in a preliminary way at least, by figures presented in the new issue of the *Journal of Forestry* by Henry Bull of the Southern Forest Experiment Station. Mr. Bull estimates that under average growing conditions, ordinary Arkansas cotton land planted to loblolly pine will yield four and one-half times more cellulose per acre under the new crop than it did under the old.

The cotton land selected for comparison is not the best in the South, but is classified as only moderately productive, yielding about 145 pounds of lint cotton per acre. The same land, under best tree-growing conditions, can yield 3,616 pounds of dry wood per acre per year, with a net cellulose content of 1,627 pounds, or 11 times as much wood cellulose as cotton cellulose.

However, Mr. Bull admits, to compare the best that land can do in producing wood with "only average" in producing cotton is hardly fair. So he reduces the tree stand to an "only average" basis for purposes of comparison. Recent Forest Service figures show that the average wood production of trees in that general region is about 40 per cent of the maximum possible. Applying this factor, therefore, to comparative yields, Mr. Bull shows that loblolly pine would still outyield cotton 4.5 times, in per-acre production of cellulose.

Direct comparisons may be misleading, however, Mr. Bull warns. Cotton cellulose and pine cellulose are quite different substances and have very different qualities and uses. But even so, the much greater possible production of pine cellulose on certain Southern lands would seem to make the subject worthy of very serious consideration.

A new order provides that non-residents in Alaska must live in the territory three years before they are eligible for resident trapping privileges.

Italy ranks first among European producers of rayon and short fibers, making about 16 per cent of the world's output.

A polar bear shot in Quebec Province last autumn must have traveled nearly 400 miles from James Bay through dense forest and along rivers.

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[illegible] No. Michigan Avenue, CHICAGO, ILL.

Legs Of Ducks Transplanted On Chickens Before Hatched

Legs of turkeys and ducks growing on young chickens, legs of chickens and guinea fowl on young turkeys—a grand general mix-up transplantation of drumsticks and second joints all around the poultry yard has been achieved by Dr. Herbert L. Eastlick, young University of Missouri zoologist.

These legs are all extras, too, added by tissue-grafting while the birds were still embryos in the shell, only two or three days along in their incubation. A very delicate and patient technique had to be used, chipping away enough of the eggshell to expose the embryos, clipping off the limb-beginnings of one and transposing it to another, and sealing over the hole in the shell with an artificial covering.

Some of the embryos died before hatching, just as eggs in any incubator may fail. But even these showed that the transplanted legs had "taken" and were developing. In some, the transplants were fastened not to the outside of the body wall but within the body cavity.

Still living, according to Dr. Eastlick's report in the current issue of the British science journal, *Nature*, are three chicks with extra guinea-fowl legs, and one chick with an added duck leg. The duck leg lacks one toe, but is otherwise in good condition, including the web on its foot. It seems to have a nerve supply from the body, although it cannot be bent.

Where the transplant was of a colored leg onto a white chick, color spread to the area surrounding the graft if a little of the embryonic tissue that eventually forms nerves was included, but if none of this nerve-making material was present the only color developed was on the transplanted leg itself.

Teeth May Be Lacquered To Guard Against Decay

Coating teeth with a lacquer not unlike that now used on automobiles, furniture and finger nails may be the method of tomorrow for preventing tooth decay. Investigations suggesting this possibility have been reported to the American Dental Association by Dr. J. T. Gore, Philadelphia dentist.

The lacquer immunizes the tooth enamel against the decalcifying action of acid in the stagnant saliva, which, Dr. Gore believes, is the cause of tooth decay or caries. If his idea proves correct, the dentist, as soon as decalcification appears, would coat the teeth to prevent further decalcification in the affected areas.

Tests with a solution of nitrocellulose and amyl acetate have already been made "in the mouths of a few selected patients" and on extracted teeth.

We Broke The Bobsled Record

[*Continued from page* 39]

side of the run as we entered Zigzag and plunged into the woods. Luckily for me and the other three members of the crew, we were able to roll off inside the run and so escaped injury.

Another nerve wracking moment occurred when Curtis and I were shooting down the mountain on a two-man bob and our steering gear went haywire. Both Curtis and I heard the cast iron pulley snap, and for several seconds that seemed like hours we hurtled downward, knowing that we had no means of controlling our sled. Before long it sailed up the side and over, but Curtis and I rolled off into the run and once again I was unhurt.

Bobsledding is not just sliding down hill, as a lot of people seem to think. A great deal of skill and knowledge is required both in the construction and the handling of the sleds. Improvements are constantly being made and records lowered. The record of one minute 57.68 seconds Curtis and I made in the 1932 Olympics has been cut by several seconds. The four-man record is down to about one minute and 40 seconds.

A four-man bob will reach a speed of 70 miles an hour on a straightaway but going around the curves slows it up. The driver must have the skill and experience to get around those dangerous curves safely with a minimum loss of speed. The other members of the crew should know how to sway and lean their bodies so as to give the sled its greatest downward momentum. In other words, they should be bobsled centaurs. Heavy men are better than light for a bobsled crew, but they should be active heavy men and not mere masses of fat.

Except for the wooden board on which the crew sits, bobsleds are constructed of steel. One of the most important factors for speed is the shape of the runner, as a change of as little as 1/64 inch in the curvature of the runners will make a difference of 15 seconds in four heats. The usual curvature in the runners of a two-man bob is a 55-foot circle, with a 6-inch flat spot filed in the center of the front runners and an 8-inch flat spot in the rear runners. In a four-man bob the curvature is the radius of a 65-foot circle and the flat spot, filed in the center where the weight rests, is eight inches in front and ten inches in back.

Flexibility is also important for bobsled speed. For this reason sleds of the latest design have a ball and socket joint instead of a king bolt connecting the front sled to the rest of the bob. A flexible cable steering gear in place of the old-fashioned rigid steering apparatus adds to speed. Each runner should give separately, so that if one runner hits a bump in the run, it alone will take up the shock instead of the whole sled.

Trials were held on Mount Van Hoevenberg last February to determine who would represent the United States in the 1940 Olympics. A team winning this race, even if they had lost every other race that season, would be chosen to com-

[*Continued on page* 124]

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We Broke The Bobsled Record

[*Continued from page* 123]

pete in the Games. Knowing this, I spent most of the winter designing an especially speedy sled. Since there is no law against theft of ideas in bobsledding and since it is [redacted] feather in a driver's cap if he can beat [redacted] rival with that rival's own invention, I kept my sled under cover until the day before the race. By that time it was too late for anyone to copy it, and Curtis and I raced to victory.

Bobsled runs are being improved everywhere, but Mount Van Hoevenberg run is undoubtedly the finest and safest in the world. In the 1932 Olympics, after the two German teams came to grief, a grand holler of protest went up that this run was improperly designed. To eliminate alibis and to demonstrate the perfect design of the run, [redacted] bobsled loaded with cast iron and minus a pilot was turned loose at the top. This sled went through every major turn, including the tricky Zigzag, safely. It did not leave the run until just before entering the finish curve. The ruts in the ice of the last straightaway were crooked, and the sled jumped out of these crooked ruts, ran along the snow bank for 75 or 80 feet and came to a safe stop.

The 1940 Winter Olympics probably will not be held, because they are again slated for Garmisch, Germany. If they should be held, I am confident the United States will reign supreme in bobbing, because this country has not only the best drivers but also is far in advance of other nations in speedy sled design.

Ancient Malays Given Credit For Inventing Diesel Engine

The compression ignition principle of the Diesel engine was invented by Malay natives at least [redacted] thousand years before it was invented in Germany.

Herbert W. Krieger, U. S. National Museum curator of ethnology, supports this claim by showing one of the old high-compression fire lighting gadgets of the Malay Peninsula, considered probably the most efficient fire making idea that primitive men ever thought of. It is [redacted] tightly wrapped plunger which is forced into a wooden cylinder by [redacted] blow of the hand. At the bottom of the cylinder is [redacted] bit of tinder, which lights when the blow compresses the air in the cylinder, thereby generating heat.

Crediting primitive men with other brilliant inventions, Mr. Krieger says that the textile industry was saved millions of dollars of royalties when an invention for winding cord [redacted] that it could be unwound with even tension turned out to be similar to an old Fiji idea. A Fiji twine ball, in the National Museum, prevented patenting of the device.

Fighting Terror Of Oil Fields

[*Continued from page* 49]

inhabitants of another planet. Huge, they are, with their burliness accentuated by great black slickers, but they move with a measured, mincing tread wherever they walk, raising their feet high, and setting them down gently in small, dainty steps. These are "gas roughnecks," men who devote their lives to the hazardous business of capping gas wells.

The boss takes in the entire situation at a glance.

"That's some volume of gas. Doubt we can hold it with a single valve—and it's all we got. Pete, go to a phone, and see if Signal Hill's got a double valve. If not, have 'em rush one from Taft. All right, fellows, let's have at it."

The hazardous job begins. Faces are smeared with salve for protection, crash helmets are pulled low, and men walk fearlessly up to the surging gas. A few moments suffice to clear away debris. The crowd is watching tensely.

Now the machinery is started to unload heavy equipment from the truck. Bundles of pipe are unslung. Then the all important valve is dragged out. The winch operator handles it with apparent disregard for the danger from sparks it may cause, but only because he knows those holding a sling attached to the other end will keep it out of contact. Only when time comes to lower it does the operator use care; he lets the heavy valve down as lightly as a mother would place a sick child in bed.

Men move with quick efficiency to adjust slings. All is ready. The valve is raised into the derrick—carefully, to prevent sparks from contact—and all is ready. Men enter the derrick itself, walk right up to the roaring outlet!

Down the well they guide the valve as it is lowered. It is a critical moment. Gas is coming through the valve now, blowing high. They are working furiously to make a connection.

"They got it so far," a field worker yells over the screech of gas. "But that valve ain't seated well—best they can get, with that head of gas, but she's liable to blow clear out the top when they try to close her. If she does—good night!"

At his word, the crowd moves back. The roughnecks know the danger, they must know it. But undaunted, they proceed. Two scramble clear to the top of the derrick, two more over half way up. They cast down lines, to be made fast below.

"So they can come down if she pops," someone explains. "God! If this one pops, they'll come down all right, and it won't be on those lines, either."

Again the crowd shrinks back. They are ready to close the valve. Will the rampant well be silenced? Or will the valve be blown clear through the top of the derrick, taking men and all their works to destruction?

High above the earth, there is no shrinking. Men work with their quick, curiously dainty efficiency.

[*Continued on page* 126]

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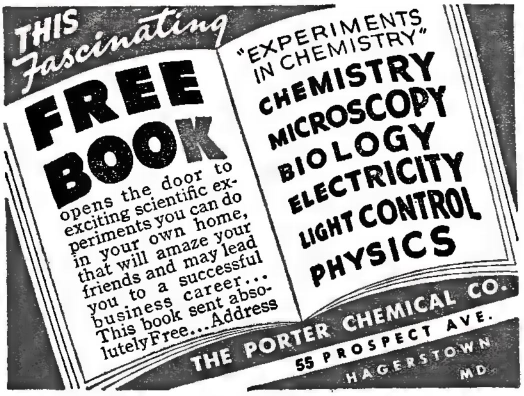

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Fighting Terror Of Oil Fields

[*Continued from page* 125]

The gas outlet is reduced by half! Shrieking like a million souls in torment, it is now spewing high in the air, almost invisible, so thin is the ribbon.

"Another minute tells it!"

A minute? No, an hour, a year, while the wail of strangled gas rises to an almost inaudible crescendo. There is a last twist—and silence, save for a groan from the derrick and valve as they accept their awful burden.

The well is conquered.

The silence is so intense that for a moment, the drowsy chug-chug of the field is inaudible. So quickly has the battle been won that it is hard to realize that a grim drama has been enacted and ended.

Roughnecks come down. Their faces are a black smear, covering still tense muscles. They are breathing heavily.

"A cinch," one of them pants.

Ice Fishing Grows In Canada

[*Continued from page* 53]

area. The next day the catch begins to be hauled in, often averaging 45 whitefish of about five pounds each per net. The fish are dressed on the ice, freeze in the cold air, and are packed in wooden boxes which hold 150 pounds, ready for pick up by airplane or tractor.

Sometimes the ice, under a heavy blanket of snow becomes weakened, slush forms between ice and snow, and tractor loads of fresh caught fish have been known to go under, with the men and some of the fishermen jumping for their lives from the drowning load. Sometimes the ice gives way under the men hauling in the fish, and it is touch and go to save life in the cold northern Canadian fishing grounds.

* * *

"Biggest structure ever built by man" is the way Spokane, Washington, describes the Grand Coulee Dam on the Columbia River.

* * *

A curtain material made of a new secret compound, mainly rubber, is said to resist sunlight and to be more flame resistant than most curtain goods.

* * *

Brewed coffee can now be bought in cans ready to serve cold or heated.

* * *

Rumania is out-ranked only by the Soviet Union among European producers of oil.

* * *

Race horses travel about 55 feet a second, and to photograph their position at the finish requires exposure speed of 1/500 of a second.

Dresses Made From Milk

[*Continued from page* 74]

threatened during the Ethiopian conquest Italy turned to the development of a substitute. The new material is the result.

In producing artificial wool milk is weighed and passed through a heater into a skimming machine, where it is separated from its cream. The skimmed milk passes into a curdling boiler to be treated by chemicals which produce coagulation of the casein suspended in the milk. The casein thus collected is sent by a casein hoist into a press filter, where whey is eliminated. The solid casein goes to a mixer to be dissolved by chemical reagents and then is sent on to maturing and filtering tanks.

Again in liquid form, the casein is forced through a spinneret of platinum containing 600 minute holes calibrated to the finest precision standards. It then passes through a precipitating bath which solidifies it into filaments. The filaments are carried as fine white wool threads, each consisting of many filaments, to small rotating cylinders on which they go to cutting machines to be cut into desired lengths.

Dolls Become Actors

[*Continued from page* 57]

cursed them, saying, "May you all turn into ravens!"

Years later the daughter learns she is the cause of her brothers' fate and that they live in the Glass Mountain. Seeking them, she grows tired and falls asleep in the forest. A prince finds her, and their marriage delights his people, but her silence baffles him.

She is tried as a witch when her own sons turn into ravens and is condemned to die at the stake, but she remains silent, for to free her brothers she cannot speak a word for seven years. Previously the princess had taken care of an old blind man and his daughter. They demand her release, and at that moment her seven-year spell is over. Her brothers, restored to human form, rescue her and bring back her sons.

New Air Speedster

[*Continued from page* 42]

hour. In landing after its first test flight this high speed caused the landing gear to collapse, damaging the propeller, fuselage and wing. Bean, however, was unhurt.

Floyd rebuilt his ship and claims for it a top speed of 350 miles an hour. The power plant is a 400 horsepower Menasco engine.

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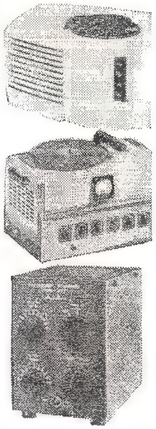

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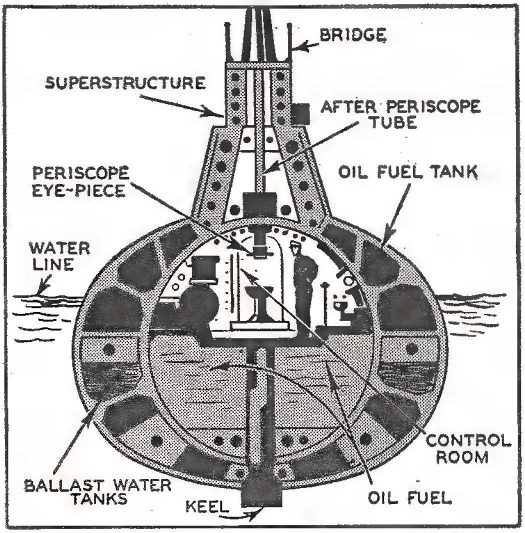
(SEE PAGES 13 and 117)

Will Submarines Win War?

[*Continued from page* 63]

more than 8,000 miles and can carry provisions for from three weeks to two months at sea. She may have from four to ten torpedo tubes, depending on her size, and may carry from eight to twenty torpedoes.

On the surface, Diesel engines give her a top speed of about eighteen knots, which is speed enough to overhaul the average merchantman. Submerged, she can make eight or ten knots, running on her batteries. She can cruise twenty feet down and have a good view of the surrounding sea through her periscope. Also, she can lie far under water and not only detect any approaching ships with delicate sound instruments, but chart the ship's speed and direction. She can even fire a torpedo at the ship without a direct sight of the victim! Small wonder that Britain regards the submarine as its deadliest menace, and is turning every effort to the task of working out effective protection for its ships against German U-boats.



This is a cross section view of a British submarine, the *X-1*, which is 363 feet long, displaces 2,780 tons, and carries a crew of 109 men. Germany's "minnows" are one-third as long, have one-eleventh its displacement, and carry but one quarter of its crew.

Just what are the ways of checking the submarine terror? They are particularly vulnerable to depth bombs, which, if they don't actually sink the sub, may put the controls out of commission. One well-aimed shell from a deck gun can spell doom to a submarine and its crew. Heavy steel nets can keep submarines out of harbors at night and are specially effective when studded with mines that explode on contact. Such nets can be hung at the usual submarine cruising depth.

Air patrols are effective against submarines in the daytime, especially so over the British channel

[*Continued on opposite page*]

Will Submarines Win War?

[*Continued from preceding page*]

and around various important harbors in England and France. From the air it is possible to spot submarines submerged to a considerable depth, and planes have bombed undersea boats on or near the surface as well as guiding warships to sub-infested waters where they could use depth charges. It is interesting to note, in this connection, that the twenty-four planes of the ill-fated *Courageous* had been scouting for submarines that might menace the ship lanes.

Undoubtedly the most effective method of protecting shipping is the convoy system. During the World War it took two and a half years of staggering losses to convince the British that the convoy system would protect their life line. Once established, it provided the most effective technique for coping with the undersea raiders.

The convoy system consists of gathering a fleet of from five to twenty ships and sending them out together, accompanied by fast cruisers and destroyers. Although such a parade of ships might seem to provide the submarines with a perfect target, World War experience proved differently. Submarines which got close enough to attack were detected and trapped in nearly every instance before they could fire more than one torpedo. The effectiveness of the convoy system was demonstrated by the fact that 2,000,000 American soldiers were sent to France under such protection with a loss of less than 1,000 men!

Britain has learned her convoy lesson. On September 4, the day after the present war was declared, Winston Churchill, new First Lord of the Admiralty, assured the British Commons that a convoy system was already being established.

Submarine warfare depends on surprise attacks, and it was inevitable that the first weeks of the war should see the underseas craft showing great destructive success. With the swift formation of defense measures such as airplanes, depth charges, mined nets, and clever "decoy" boats, along with the proven convoy system, Britain is now prepared to wage relentless war on the undersea raiders.

While submarines are greatly improved since the World War, the defenses against them have advanced just as rapidly. It is extremely doubtful that today's U-boats will have anywhere near the success enjoyed by their World War predecessors in scouring the seas—and they certainly will not win the war!

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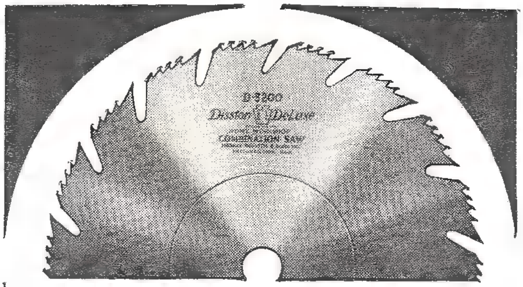

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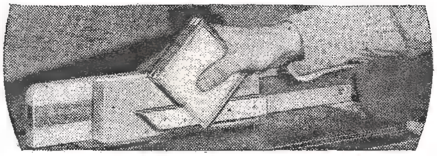

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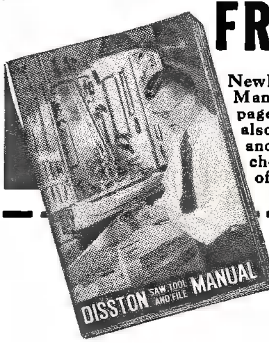

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The "Headless" Woman

[*Continued from page* 77]

armchair on a stage. In place of her head there is an upright metal tube from which radiate four rubber tubes connected to an oxygen tank apparatus. The lecturer, to heighten the illusion, relates that an eminent surgeon in Vienna perfected this apparatus with which he could sustain life in an animal or human being after the head was severed from the body.

The first opportunity to test the device came to the surgeon, so the tale goes, when a young lady was brought into the hospital with her head almost severed. Though she was still alive, death would normally have occurred in a few minutes, but by use of this apparatus her life was saved.

The lecturer proves Helena is real flesh and blood by squeezing the flesh of her arms and legs. He will even permit doctors to listen to her heart beat with a stethoscope.

The illusion is created by a triangular, mirrored apparatus underneath which is a space for Helena's head. The lecturer lowers the apparatus when Helena throws her head back, allowing the two mirrors, set at a 45-degree angle, to drop in front of her face. The juncture of the mirrors is concealed by the upright metal tube to which the "oxygen" meter is attached. The curved edges of the mirrors are cleverly hidden by split rubber tubing.

The audience imagines it is looking through the loops of these rubber tubes at the rear of the stage, but in reality what is seen is the reflection of the side walls.

Fun In The Snow

[*Continued from page* 87]

When the wall is started, the end gate is taken off and the form simply pulled along as the work progresses. Two boys with shovels and one with a tamp can make quick work of a very substantial fort. The snow-ball howitzer can be made with either a round or square barrel. If the top of the latter is left open, it can be loaded without exposing the gunners to the "enemy's" fire, as the charge is simply laid in the trough at the breech.—*H. S.*

A spare tire benefits when stored inside a car, away from the sun.

The hole dug for a transplanted tree should be deep and ample, says a Harvard botanist, adding: "It is always better to plant a 50-cent tree in a three-dollar hole than a three-dollar tree in a 50-cent hole.

Every industry, as well as every human being in this country, is dependent on salt, says the U. S. Bureau of Mines.

Radio Equipped Snow Plows

[*Continued from page* 79]

14,380 foot peak, that within half an hour a traversable road can become impassible. Cars may be trapped—unable to move either way.

When developing the equipment used in this unique radio control system many unusual conditions had to be taken into consideration. The section of the state to be covered, officially designated as California Highway District II, is as large as the combined areas of the states of New Hampshire, Massachusetts and Connecticut. And not only are the air-line distances great, but the rough terrain hides sections of highway in deep canyons, making radio reception difficult.

Preliminary tests were made with a specially equipped car in order to determine the particular type of equipment and power required to provide dependable contact between the snow plows and their bases, and between Redding, the district office, and the various maintenance stations.

The specifications as finally developed were for 50-watt telephone and telegraph transmitter sets at maintenance stations. These sets work on either 110 volts, 60 cycles, or on a 12-volt truck battery, and the change-over can be effected instantly. Transmitters in the snow plow cabs operate on telephone only, with a power of 50 watts, and are duplicates in size and controls of those at the stations. The plow battery supplies the power, high voltage being developed by a genemotor. Plow transmitters are practically waterproof, and are mounted on rubber washers to minimize shocks. The battery drain when transmitting is considerably less than the charging rate of the generator.

In order to provide constant communication with snow plows working in the deep and winding Sacramento River Canyon, the transmitters at Redding and Yreka are of 200 watts on the voice frequency and 350 watts on telegraph.

Receivers are of the fixed frequency type, permanently tuned to the assigned frequency of 2,726 kilocycles for voice and 3,190 kilocycles for telegraph. Those in the maintenance stations have speakers mounted in them. The rotary plows are provided with a remarkably small speaker mounted on the cab wall. The station receivers can be changed from 110-volt a.c. to 12-volt d.c. operation by turning a panel knob. The plow receivers operate only on 12-volt d.c.

At some of the maintenance stations advantage was taken of standing timber to carry antenna. At others red fir trees were cut and three 100-foot poles erected in the form of a triangle. The station transmitting antenna is a half wave (171′ 6″ long), the receiving antenna being of the doublet type 140 feet long with a coil in the middle.

Snow plows are equipped with an entirely new type of collapsible antenna. When not in use this unit lies back out of the way over the cab

[*Continued on page* 132]

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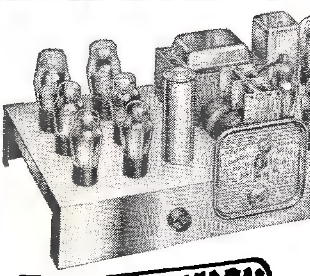

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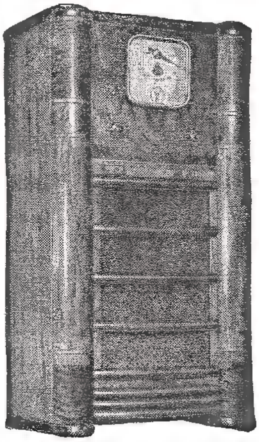

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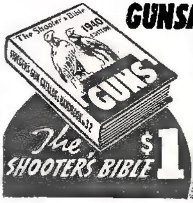

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Radio Equipped Snow Plows

[*Continued from page* 131]

and plow body, but well inboard and extending only 12 inches above the top of the cab. By means of a lever in the cab the operator raises the antenna 12 feet vertically. Then a few turns on a small crank extend it to a height of 23 feet. Less than ten seconds are required to place this rugged and highly efficient radiator in service.

While the radio equipment was being installed, volunteers began studying for examinations for federal communications licenses. As a result there are now more than 125 licensed radiophone operators available, and many are preparing themselves for radio-telegraph examinations to be held before summer static forces use of telegraph instead of telephone communication.

The daily operating procedure begins at each station 15 minutes before the snow plow operators go to work. This early morning, rapid fire exchange of information between stations, tabulated on printed forms, provides the district engineer and all maintenance foreman with a complete summary of the condition of all roads in the district, the weather and temperature at each point, and the forecast for the next 24 hours. With this initial information the snow plows start their patrol duty along the highways. Throughout the day plows in operation report back to their bases each hour. A constant standby is maintained at all stations and by all plows on duty, so the entire district has an hour-by-hour picture of what is going on at the front, and snowfighters can report roads opened for traffic, breakdowns, impassible snow barriers or call for assistance any moment. During storms there is both a day and night watch on duty.

Operation of this radio control system has proved to be so satisfactory that plans are under way for equipping four other California highway districts.

Adjustable Printing Easel

[*Continued from page* 81]

cut two strips of metal 2 by 15 in. and solder one each to the two larger right-angle pieces. The right-angle piece is soldered on top of the sliding arm and overlaps the edge ⅝-in.

Place one of the smaller angle pieces against the ¼-in. face of the long strip, slip a battery clip over them in the center and solder the prongs of the clip to the angle pieces. These slip under the T-shaped pieces to permit the sliding arms to work freely. (See details in the upper left-hand portion of the drawing on page 81.) Remaining details of the construction are obvious in the drawings.

Nova Scotia sends more apples to Great Britain than all its other overseas dominions put together.

Original Christmas Gifts

[Continued from page 85]

Walnut Humidor (*Fig.* 4)

Here is a he-man's idea of a humidor. All wood? Yes. But wait. There's provision for moisture, too, as we shall see. Stock is glued up 5-in. square. Square one end and fasten it to the metal lathe face plate. The 5-in. deep inside turning can be ideally done on the metal lathe as a photo shows. You can do a pretty good job on the wood lathe however, if you have a round nose chisel with an extra long shank and handle. Nor need the depth be this great.

With the inside turned, throw it on a snug-fitting jig on the wood lathe and shape the outside with hoops. Cut off unneeded bottom waste. Sand, rub with fine steel wool, finish with a good filler and clear lacquer. The lid is easily turned with a recessed underside for a bit of sponge rubber or discs of blotting paper. Don't lacquer or shellac inside of humidor or under side of lid. Instead, pour some hot paraffine into the humidor and rotate it until a thick coat of the wax has been built up over sides and bottom. In like manner, also treat under side of lid and the recess. Paraffine is tasteless and odorless and a thick layer will keep the contents well sealed. In fact water poured in and left over night won't get to the wood.

Pipe Rack (*Fig.* 5)

Here's something different in pipe racks. Without a special sanding tool, it is difficult to make those shallow, neat recesses in pipe racks, for each pipe bowl. Instead, turn the shallow depression all the way around in the base, with a small shoulder at the edge. The upright is nickle-plated brass pipe, threaded at both ends. The holes in top and base are a bit undersized so that the threads in the metal will cut their way into the wood and make a rigid assembly. Figured gum or walnut might be used. Dimensions may vary of course and the rack made to accommodate either 4 or [illegible] pipes. Finish in clear lacquer, rub down slightly with No. 4 steel wool and wax. Felt the bottom.

Cigarette Book (*Fig.* 6)

Much of the charm of this easily made cigarette book lies in its finish. The back strip is ½-in. thick; all other material should be about ¼-in. thick. Leather thongs ⅜ or ½-in. wide, are used for hinges. The inside may be provided with a partition to give two compartments, each wide enough to take loose cigarettes easily. Groove the top heavily with a sharp knife to add a rustic touch, then score the ends and front with a sharpened file tang to stimulate leaves of a book. Stain and lacquer, then rub down with steel wool and wax. The name plaque is thin wood of contrasty color (light if the rest of the wood is dark, dark if the book is made from maple) glued in

[Continued on page 134]

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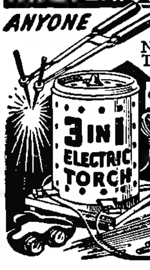

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Original Christmas Gifts

[*Continued from page* 133]

place on which the word "Cigarettes" has been lettered in ink or paint, or burned or cut into the surface.

Bracelet (*Fig.* 7)

Bracelet projects are fraught with many possibilities. The one shown is the simplest. The sketch shows the successive stages of cutting. As a rule, the inside diameter should be 2½-in., the over-all diameter, 3-in., or thereabouts. Use a small faceplate with center screw. True up the block, round the edge and make most of the inside cut from the front. Then sand and give a clear, thick coat of lacquer. If the wood is coarse grain, use filler, stained, first. Then finish the cut—the last being from the back side. Sand the inside with a small sanding drum and wipe lacquer on the inner surface. The sketch shows a two-toned type obtained by gluing a thin strip of contrasty wood over the other block, then finishing as one piece. Dozens of variations in bracelets are possible.

Name Pin (*Fig.* 8)

Perhaps the simplest of these is the "Peggy" pin shown. Lay out the name in nice balance with letters properly spaced. Do this on paper and when you have a design you like, transfer it to thin plywood, then jig saw it out. Sand, finish with lacquer and fasten a safety pin to the back either with household cement or by gluing a strip of cloth over the straight side of the pin.

An alternative type of pin is made by jig sawing out the name or initials from very thin wood (do this with the thin piece held between thicker pieces to prevent breakage) and gluing the finished cutout on a thicker plaque of wood of contrasty coloring about ⅛ or, at most, not over 3/16-in. thick. Then finish by sanding well, lacquering, rubbing down and waxing. Either initials or names may be used. Girls with long names especially, often have a nickname which may be used instead. Or if the girl's name has more than 6 or 7 letters, use her initials instead.

Tie Rack (*Fig.* 9)

Lay the design of this tennis player out on thin plywood and cut it out, with plenty of solid wood at the bottom to which may be attached the disc segment. This segment is a piece cut from a wood disc 5-in. in diameter—the cut being a little to one side of center. Mark heavy lines with a file tang to give the arm, racquet, cap and other outlines, then paint with the colors indicated and finally lacquer. A number of L type screw hooks are turned into the curved front of the rack, 12 being about right. Make a small hole through the player's head to hang it by. For variety, you can use a hunter, ball player or other designs if desired.

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Build A Seven Man Bobsled

[*Continued from page* 86]

The rear runner is identical with the forward one except that the cross member is set on edge, as illustrated, and eyebolts are installed, with the nuts countersunk. A corresponding set of eyebolts are installed in the cross member of the seat plank, and a long bolt pushed through them forms a substantial hinge joint.

Having constructed the runner plank, with pilot's foot rest and the other foot rests, a seamless-steel guard rail is fitted, the forward end being bent up and the after end curved in. This is accomplished by heating with a blow torch and bending an inch or two at a time. The ends are flattened and bolted to the side members in back, and under the pilot's foot-bar in front. Brass straps bolted through the foot rests secure the guard rail.

A standard Model T steering wheel is satisfactory, and the cold-rolled steel shaft turns in two sections of brass tubing. The lower bushing is installed in two two-by-fours, as shown.

For fewer than seven passengers, cut off 12-in. and one foot rest for each passenger less, at the same time moving the rear runner forward an equal distance.

Under-surfaces of the runners should be thoroughly sanded and waxed, and see that the riveted and casein glued cleats are snug against the plywood. These keep the sleds on the course.

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POUCH 1.00
TOBACCO .30
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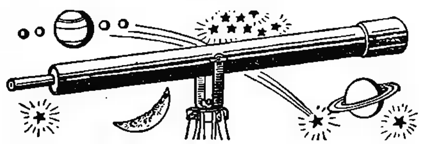

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GUESS I KNOW HOW TO PICK WINNERS! —IT'S A LAMBERT PRODUCT.
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MEXICAN Curios sell on sight. Large profits. Free particulars. Samples 10c stamps. Marquez-MA Apartado, Mexico City.

ATLAS Window sign letters. Large sizes—penny each. Get beautiful samples. Atlas, 7941-G Halsted, Chicago.

300% PROFIT Selling Gold Leaf Letters for Store Windows; Free Samples. Metallic Co., 448 North Clark, Chicago.

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SEE our display ad Page 118. Cleveland Boat Blueprint Co.

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BUILD power Scooters, Midget Cars. We supply tires, wheels, motors. Lowest Prices. Send 10c for plans, etc. Bild-Ur-Own Devices, Dept. 12-D, 536 North Parkside, Chicago.

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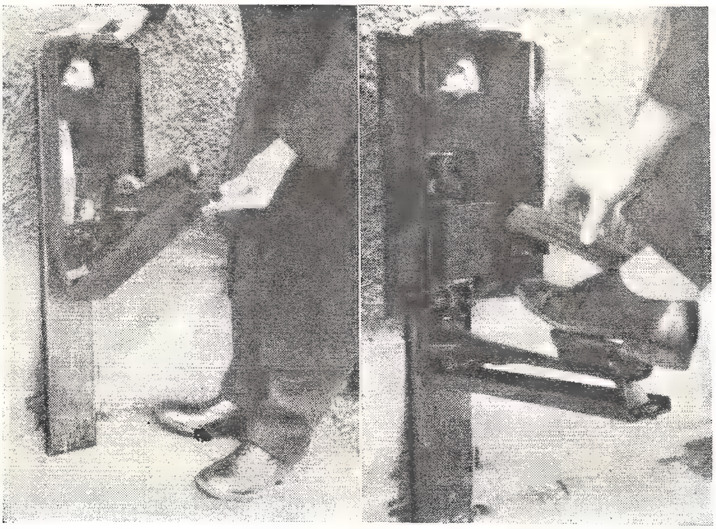
Folding Shoe Shine Kit For Home Use



This compact shoe shining kit for the home unfolds quickly to permit immediate use. The bottom is hinged so that, when the cover is lowered, the sides project outward. The inside cover contains the foot rest.

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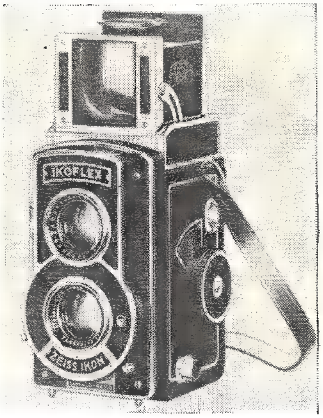
New Ikoflex Camera



The new Ikoflex III, with f-2.8 Tessar lens just announced by Carl Zeiss, Inc., is a twin-lens reflex camera which takes pictures 2¼x2¼ inches. This new model has a plano-convex viewing screen which gives a brilliant image. The camera is corrected for parallax through its full range. The model is also featured with a 4X magnifier for focusing, a quarter-turn focusing wheel, a depth of focus scale, eye-level view finder and rapid film winder. The lens is equipped with a Compur-Rapid shutter with speeds up to 1/400 sec. It also has a self-timer.

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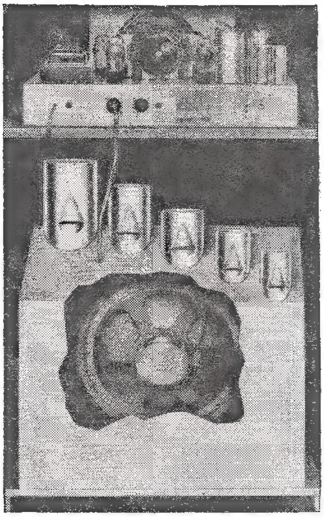
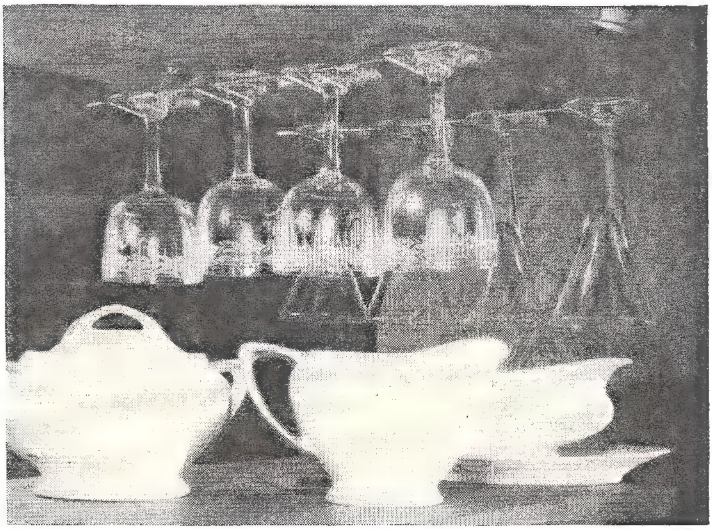
Giant 17 Tube Radio



The new 17-tube radio receiver shown above employs an unusual sound chamber consisting of a series of five organ-like pipes protruding from the loud-speaker housing. Truer tones reproduction and elimination of "booming" effects are the advantages claimed for this arrangement.

Stemware Rack Doubles Shelf Space



Fastened to the under side of the shelf, this stemware rack suspends glasses upside down in space that would otherwise be unused, thus greatly increasing shelf space.

PROLONG Life—Follow Nature's Way. Copy The Art of Living and Simple Health Rules, 10c. Sunshine, 56 W. Van Buren, Joliet, Ill.

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ELECTRO-SCRIBE: Electric Pencil. Writes—Engraves all Metals $1.00. Health Lamp: Dual Ray—Ultra Violet —Infra Red—Promotes Sun-Tan-Vitamin "D"—Automatic AC-DC Current, $3.90. Details. Beyer Mfg. Co., 4515-G Cottage Grove, Chicago.

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FORMULAS. Latest Money Makers. Literature free. D-Belfort, 4042 N. Keeler, Chicago.

FORMULAS—All Kinds. Guaranteed. Catalog Free! Kemico, 67 Parkridge, Illinois.

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SALARIED Positions; $2,500 yearly and up. Let us try to get one for you; small cost. Write for valuable information No. M-O. M-4. Executive's Promotion Service, Washington, D. C.

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20 MEXICAN Patterns and instructions for making Mexican wood novelties 25c. 20 Cowboy Silhouette patterns 25c. Plans for building Scrollsaw 25c. 10 Lawn Ornament patterns 15c. (75c brings all.) Mex-Artcrafts, Eagle Pass, Texas.

PATTERNS:—Plywood novelties, Silhouettes. Also transfer decorations. 170 items illustrated. Write: Wo-Met Shop, Ashburn, Georgia.

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A tool that holds a mower in any position lessens time necessary for sharpening. An adjustable crank turns the wheels and rotates the blades in reverse.

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20 PATTERNS—Lawn Ornaments—Silhouettes—Novelties—30c. N. Milne, 314½ N. 5th, Saginaw, Mich.

22 FULL Size lawn ornament patterns 25c coin. Strother, Box 383-AW, Belington, West Virginia.

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WE SUPPLY every noted magician. Large Professional catalog 25c. Holden, 222 West 42nd St., New York.

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M. M. EARNED $267, three weeks, raising mushrooms in cellar! Exceptional, but your cellar, shed perhaps suitable. We buy crops. Book free. United, 3848 Lincoln Ave., Dept. 86, Chicago.

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LOCAL Agents Wanted to Earn bonus suits and demonstrate to friends. Up to $12 in a day easy. Experience unnecessary. Valuable demonstrating equipment, actual samples absolutely Free. H. J. Graves, 1300 Harrison, Dept. A-819, Chicago.

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INVENTIONS—Manufactured in any quantity at low cost. Wood, Rubber, Metal, Plastics or Models. Estimates and free catalog. Crescent Tool Co., Dept. T, Cincinnati, Ohio.

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18 COLORED Picture Souvenir Folder of California's Scenic Wonderland. 15c (coin). Schumacher, 943 S. Sycamore, Los Angeles, Calif.

RECEIVE gigantic mails, magazines, samples. Your name in numerous mailing lists 10c. Albert Brentwood, 56 Rutgers Street, New York.

BURIED TREASURE, Minerals, free booklet, photographs. Fisher, Palmer Bldg., Hollywood.

40 DIFFERENT View Postcards 25c postpaid. Funshop, New Gloucester, Maine.

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Refrigerator To Operate At 450 Degrees Below Zero

The world's coldest refrigerator, operating at 450 degrees below zero Fahrenheit, is in prospect as the result of discoveries reported to the American Chemical Society by Professor S. C. Collins of Massachusetts Institute of Technology.

The new type refrigerator would operate on compressed helium, the light inert gas used to inflate airships. When liquefied, helium produces the coldest cold known to man, only a few degrees above absolute zero.

"One does not ordinarily think of a steam or a compressed-air engine as being a refrigerating machine," Professor Collins reported.

"Yet the well known principle on which they operate consists of the withdrawal of heat from the working gas and its conversion into work. Any gas expanding against a working piston is cooled by expansion. For instance, the temperature of a sample of air originally at 70 degrees Fahrenheit will fall more than 100 degrees if allowed to double its volume in an engine cylinder."

Major trouble to be overcome in a compressed helium engine, Professor Collins indicated, is the matter of lubrication, for at 450 degrees below zero Fahrenheit all lubricants are frozen solid.

Professor Collins solved this difficulty by doing away with lubricants and replacing the conventional piston of an engine with a flexible diaphragm of stainless steel. This diaphragm is sealed at its edges by a copper gasket between two steel plates. The expansion of the helium occurs between the diaphragm and one of the plates.

Skull Of Biggest Prehistoric Monster Arrives In America

The massive skull of the biggest prehistoric sea monster ever found, a 60-foot plesiosaur which swash-buckled the oceans 120,000,000 years ago when dinosaurs ruled the earth, has been assembled and prepared for exhibition at the Harvard Museum of Comparative Zoology.

Authorities described the beast as "the most amazing specimen of its kind known to the world." It was discovered by William E. Schevill of the Museum staff in an exposed ancient [illegible] bed in Queensland, Australia. Others have previously been found in various parts of the globe but never one even approaching this one in size.

The skull measures 10 feet in length and three feet in height and has heavy alligator-like jaws studded with 92 interlocking spiked teeth from two to eight inches long. The specimen was prepared by George Nelson of the Museum staff.

Scientists have described the giant plesiosaurs as resembling in many ways the mythical sea dragons which terrified ancient mariners. They ranged in length from about 10 to 60 feet with long heads and stubby tails. They used four powerful, paddle-like limbs to propel their tremendous turtle-shaped bodies through the water.

They were the greatest marine reptiles which ever lived, masters of their realms as the dinosaurs were on the land, and they roamed the great seas which covered most of the earth, devouring fishes and reptiles in their jaws.

Both plesiosaurs and dinosaurs were confined to the Mesozoic era.

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"Stone" Lantern For Garden

[*Continued from page* 93]

stick. When it has set, the form is knocked apart and removed.

The base disk "D" can be poured into a hexagonal mould laid on tar paper on the ground and banked with dirt. A strip of galvanized iron is used in pouring section "E." The heavy base "F" is made by plastering over the legs and filling the box with cement. The legs are plastered on the inside while in the inverted position, and as soon as cement is hard enough to permit, the form is set right side up and work completed.

Move the sections to the permanent location before cementing together, as the completed unit will weigh about 300 pounds. Final finish is one-part water and two of sand sifted fine, and applied with a paint brush. In the cement work, allow each section to set at least a week, keeping it out of the sun, or covering with burlap and spraying with the hose at intervals.

A shaded location is most attractive, preferably at the end of a path where one's first glimpse is at a distance. If in a fairly cool spot, frequent sprinkling may encourage a mold which gives an effect of great age.—*Hi Sibley.*

Cut-Outs For Christmas

[*Continued from page* 100]

made life-size or smaller if you do not care to use that much material.

Santa starting down the chimney is thrown in sharp silhouette at night by the light from the aluminum-painted moon. If the chimney is too hot for this purpose, make a dummy chimney. Eight-foot sentinels in jolly mood guard your door and invite rather than turn away callers. For window decoration, the Yule-log silhouette or the illuminated, transparent wreath are effective, and an illuminated tree is made in the simplest way by using a celloglass cone with lights inside. Santa's sleigh should be drawn by at least two teams of wooden reindeer, and painted as indicated. Rocking horse, jumping jack, and old stone chapel can be made any size you wish. The little girl picking a package from an outdoor tree will appear very lifelike, painted with some care. —*Hi Sibley.*

Bird casualties on the highway are attributed mainly to cars traveling over 35 or 40 miles an hour, and one observer thinks the draft from the fan may partly hinder the birds from escaping high-speed traffic.

A hitherto unknown herd of 400 wild horses was found in Wyoming during an airplane round-up count of wild life.

Coat Of Arms In Colored Clay

[*Continued from page* 106]

are also ample illustrations in these books.

The various symbols are easily molded from colored clay which can be purchased in the dime store as modeling clay for children. A box of a half dozen different colors can be bought for ten cents, enough for two or three plaques. Additional colors can be painted on the clay with ordinary oil paints after it has been molded.

Modeling tools can be fashioned from sticks of hard wood, pointed, flat and round, to suit your needs.

Any good piece of pine or other wood will do for a plaque. An excellent antique finish can be made by rubbing black paint on the wood with a cloth instead of painting with a brush. This reveals the grain.

Draw the design roughly on the wood. Make pins to hold the clay by cutting about a quarter of an inch from the point of an ordinary pin. Push these pins into the wood with a pair of pliers at intervals of about a half-inch.

Model each symbol separately and push it onto the pins. Paint some of the parts, if necessary, to make them correspond with the prescribed colors. Then put two or three coats of clear varnish over the unpainted clay to harden it and protect it against dust.

A brief history for the family can be typed on white cardboard, glued to the back of the wood and varnished to make a convenient and permanent record.

Making family crests to order is becoming a well paid trade. They sell for $5 to $20 apiece, carved, modeled or done on parchment and framed.

Christmas Candy Tree

[*Continued from page* 111]

3¼-in. deep, while the bottom block is 9½-in. in diameter by 3¼-in. deep. A round depression is cut in the bottom of the two upper blocks, to fit over the turned flange in the upper side of the two bottom blocks. The candy or nut tray openings are 2¼-in. deep, with diameter in proportion to that of the block. The base is 2x9-in., slightly beveled around the side and with a nut or candy tray turned to a depth of 1-in. Bore holes in the base center and bottom of the lower tree block to take the ¾-in. dowel which is glued in place. The tree can be painted dark green on the outside, with a brown trunk, or both tree and base French-finished on the lathe. The tree makes a decorative piece for the holidays, with a novel surprise inside for the family or party guests.—*E. V. H.*

In New York City, 66,800 individuals are being X-rayed within three weeks in a drive to check up on tuberculosis.

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(SEE PAGES 13 and 117)

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Battery Lighting For Trees

[*Continued from page* 113]

are too large for our purpose. We must alter the series strings to multiple in the following manner.

Buy enough flexible wire to make up four strings of two wires each. As the usual string is 9 feet long this means at least 18 feet to [redacted] string or 72 feet in all for the four strings. Cut this wire into pairs of wires slightly over [redacted] feet long. Lay each pair out parallel on the bench, connecting one end of each to the bayonet plug which was previously removed from a series string. Scrape the insulation from eight equidistant points along each of these new wires. Then cut the sockets from the series string, leaving [redacted] long a lead as possible each side of the socket. Bare the ends of these wires and then twist these ends to the bared spots on the new wires [redacted] each socket is connected "across" the line as shown. Solder these joints and tape them against shorts. Make up your four new strings in this manner. Of course if an extra long lead is desired from the plug to the first light, then more wire must be provided than has been specified.

The bulbs consist of 32 6.3 volt radio pilot bulbs or the round [redacted] volt flashlight bulb. The amperage drain is small in either case but the pilot bulbs are somewhat easier to handle. Either style will fit the miniature sockets in the strings. One tubular type bulb type No. 46 draws .25 amp. while [redacted] slightly more expensive one (round type) draws only .15 amp. This is known as type No. 50. So you see in one case the total 32 bulbs will draw [redacted] amperes while the other will draw only 4.8 amperes. Your available source of supply and amount of battery you own will determine which type of bulb to use.

The drawing illustrates [redacted] neat method of hooking up the power supply. It will be the same whether one or two batteries are used. Arrange [redacted] 4 way table or wall type receptacle near the base of the tree. Split the double cord. Attach a battery clip directly to the end of one lead marking it PLUS. Fasten the MINUS clip to the other but in addition insert a common radio switch and an auto or radio ammeter in series [redacted] shown. Then the strings, woven around the tree, can all be plugged in the receptacle below and the power switched on or off as the case may be. The ammeter reading will show you the drain on the battery.

If the strings are to be lighted for any length of time or are to be lighted often it would be advisable to use two 100 ampere hour batteries in parallel; that is connected plus to plus and minus to minus. This will give 200 ampere hours available. Divided by [redacted] amperes drain for the 32 .25 amp. bulbs you could keep the four strings lighted for 25 hours continuously before the batteries went flat. Good illumination would last about [redacted] hours. Using the .15 amp. bulbs

[*Continued on page* 145]

Battery Lighting For Trees

[*Continued from page* 144]

you could get nearly 40 hours good lighting from one charge. Using one battery the time would be about half the previous figures. Having no extra battery the car itself could be used by running it close to the house and tapping off long leads to run over to the tree. Recharging could be done of course by running the car engine [redacted] an occasional "booster."

Nothing has been said yet about coloring the bulbs but don't let this worry you. Any electrical supply house can provide lamp stains in the various bright tints. They can even be purchased from theatrical supply houses. Or, if worse comes to worse, good stains can be made at home, as follows:

Buy [redacted] many envelopes of dyeing powders as you want colors. Those suited to dyeing cotton cloth are best. Then put an ounce or two of "white varnish" in a cup and stir into it enough of the dye to give the desired shade when observed through a bit of glass spread with the colored varnish. Thus [redacted] yellow, blue, green, red and purple stain can be prepared in simple manner. Put [redacted] suitable amount of stain in [redacted] cup. Light a string of lamps and when they are warm, dip them into the stain and allow to drain off the surplus from the tip. In a few moments the heat will set the varnish. Dipping various bulbs into various colors will give you all the effects of manufactured colored bulbs.

So, all you without electric house lights, try this stunt this Christmas. It is inexpensive, simple to assemble and will give your tree all the charm of any illuminated Christmas tree and the fun will be all the greater because you made it yourself.—*L. B. Robbins.*

Bernoulli's Principle

[*Continued from page* 112]

you will find it possible to support the card without holding it in the other hand. You would expect the force of your breath to blow the card from the spool. Actually the air rushes rapidly over the upper surface of the card, creating [redacted] low pressure area and supporting the card in exactly the same way that an airplane is supported by the air.

The long shape of Italy and the prevalence of mountain districts are not favorable for good radio reception, says the Department of Commerce's Electrical Division.

In the iceberg season of 1938, no less than 691 bergs were sighted by patrol boats in the North Atlantic.

A fossil egg shell found in Nevada is believed to be the egg of a bird of the cormorant family that lived in the Ice Age.

AUDELS NEW RADIO-MANS GUIDE
THE KEY
TO WHAT EVERY RADIOMAN SHOULD KNOW

FOR HOME STUDY

Information in a handy form covering modern Radio & Television in theory and practice. An entirely New Book that Points the Way to Success in Radio & Television—JUST OUT! [redacted] PAGES—400 DIAGRAMS & PHOTOS. Featuring Authentic, Clear & Concise Radio Information. Physics of Sound—Radio Fundamentals—Ohm's Law—Batteries—Measuring Instruments—Power Supplies—Resistors—Inductors—Condensers—Transformers—Broadcasting—Radio Telephony—Vacuum Tubes—Radio Diagrams—Receiver Construction—Control Systems—Loud Speakers—Antennas—Phonograph Pickups—Public Address Systems—Aircraft & Marine Radio—Radio Compass—Radio Beacons—Automatic Alarm—Short Wave Principles—Coil Calculations—Electronic Television—Testing—Interference Suppression—Trouble Pointers—Underwriter's Standards—Tables—Review Questions & Answers—Ready Reference Index.

[redacted] this practical information in handy form for yourself—Fill in and mail coupon today.

HELP FOR YOU! $4 COMPLETE • PAY $1 A MO.

THEO. AUDE[redacted] & CO., 49 WEST 23rd STREET, NEW YORK
Mail AUDELS NEW RADIOMANS GUIDE for free examination. If O. K., I will send you $1 in 7 days; then remit [redacted] monthly until price of $4 [redacted] paid. Otherwise, I will return it.

Name
Address
Occupation
Reference M. M.

HANDEE *Hobbies*

Get more out of life. Make things with our easy working plans. 75 new, intriguing projects for the home, gifts or [redacted] sell—models of ships, planes, houses; statuettes, book ends, etc. Learn the new, exclusive Handee technique of engraving on mirrors, glassware, trays, cabinet doors, table tops, etc. It's fascinating and [redacted] easy as tracing.

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Write for free 64-page catalog. Shows Handees $10.75 up.

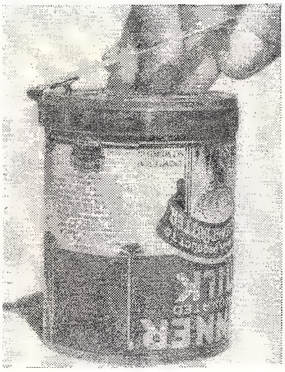
CHICAGO WHEEL [redacted] MFG. CO.
1101 West Monroe Street
Dept. MI, Chicago, Ill.

New Ideas for Home & Shop

Names and addresses of manufacturers of products described below will be sent free to any reader on request, provided a stamped, return envelope accompanies the inquiry. Mention date of issue when writing.

Wind power runs a new refrigerator for country homes. Refrigeration is retained without wind power for from 12 to 16 hours by means of brine-filled walls.

A flash bulb for use by color photographers has the same color characteristics as bright sunlight, enabling it to be used to make indoor shots with daylight type film.

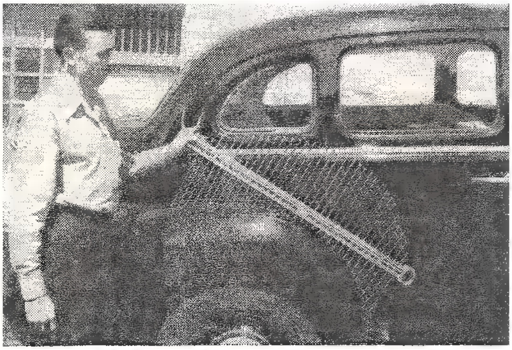


A simple device opens and reseals milk cans. A girdle with a bar hinged to it encircles the top of the can. Two spikes on the bar punch outlet holes in the can. Spikes also plug up the holes when the bar is held down by a friction clamp.

Automobile tires, rubber mats, etc., may be cleaned and covered with a sleek black coating in one operation by means of a new rubber dressing.

A plastic with unusual light reflecting power is the material used in a new reflector signal for motor vehicles. It resists breakage and can be seen from a long distance when headlights strike it.

A light trailer for ladders or scaffolding can be moved by one man or towed by an automobile. It will support scaffolding up to 40 feet high or a ladder with a work platform up to 50 feet high.



For measuring difficult contours on autos, planes or boats a tool with 34 feelers has been devised. When placed on any curved surface the feelers automatically fall into place and are kept in an accurate outline by locking the handle.

Factory finished hardwood strip flooring which is tongue-and-grooved, beveled on ends and edges, sanded, finished and waxed is now available.

This tightly coiled ironing cord is always out of the way. When fully stretched the cord measures a little over seven feet and when released coils into a compact unit eight inches long. It is rubber covered and retains its coiled position for many years.

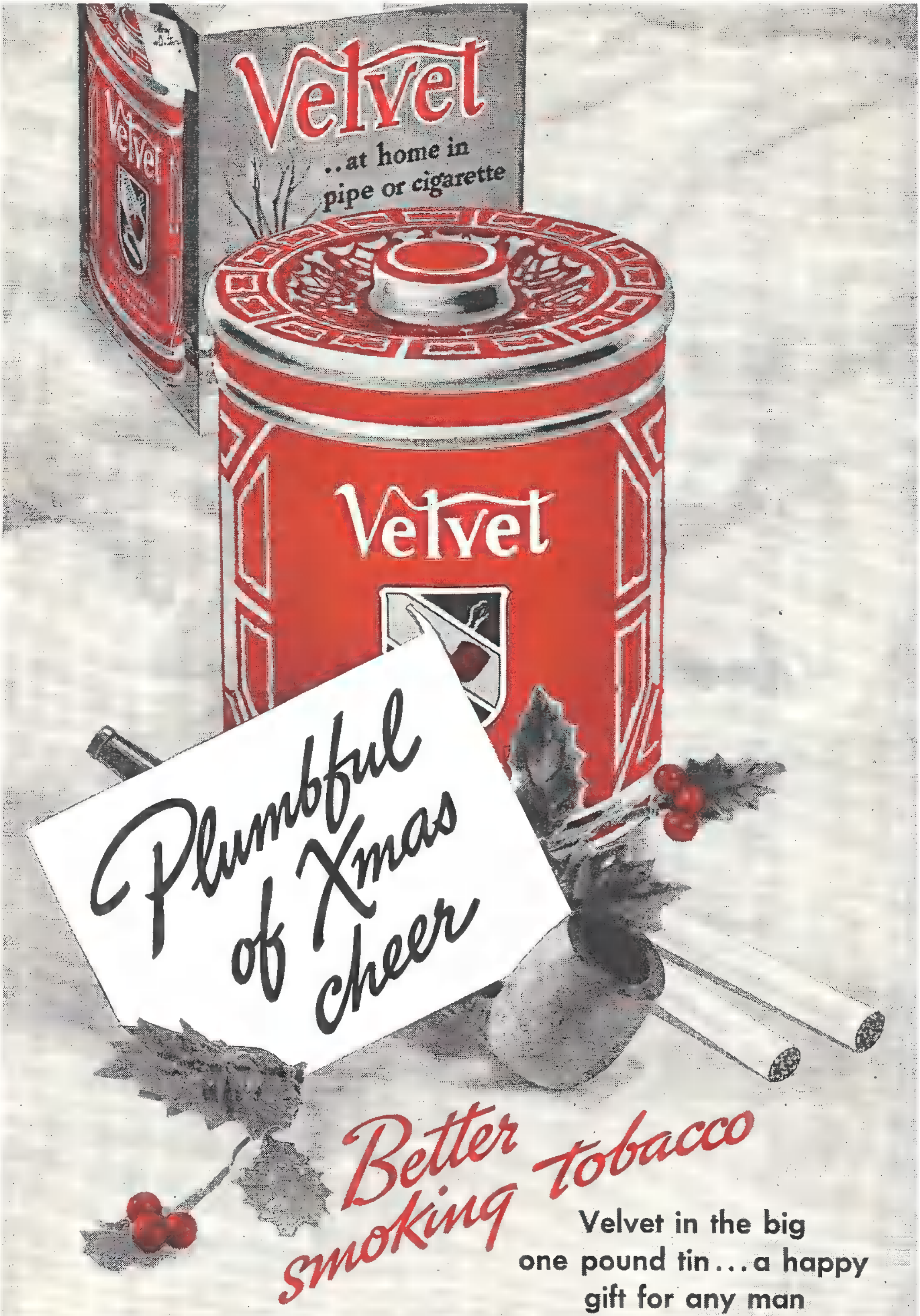
A copyholder for typists is mounted on lazy tongs swung from the side of the desk to leave the desk top clear.

A shower curtain treated with a new synthetic plastic is mildewproof and spotproof and does not stiffen with age.

Magnesia alloys can be protected from salt water and atmospheric corrosion by a new treatment which provides a good base for paint yet does not affect machined dimensions.

An interior flat white paint prevents stains from bleeding through finished painted surfaces. It can be applied with brush or spray gun over pitch, oil stain, sap streaks, etc., as either priming or finish coat.

An all-steel welded bench has been designed to provide a suitable support for bench lathes. Extreme rigidity has been secured by scientific bracing. The bench is built entirely of metal with welded joints.


Velvet
..at home in pipe or cigarette
Velvet
Velvet
Plumbful of Xmas cheer
Better smoking tobacco
Velvet in the big one pound tin... a happy gift for any man

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Wishing you more pleasure
Chesterfield CIGARETTES
They Satisfy
Chesterfield CIGARETTES
They Satisfy
Always welcome... CHRISTMAS CHESTERFIELDS IN ATTRACTIVE GIFT CARTONS

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I Jumped from $18 a week to $50

--A FREE BOOK STARTED ME TOWARD THIS

Good Pay in Radio

--- HERE'S HOW IT HAPPENED

by S.J.E. (NAME AND ADDRESS SENT UPON REQUEST)

Makes $50 to $60 a Week

"I am making between $50 and $60 a week after all expenses are paid, and I am getting all the Radio work I can take care of, thanks to N. R. I."

H. W. SPANGLER
138½ S. Gay St., Knoxville, Tenn.

Over $1,000 Before Graduating

"Before completing half the N. R. I. Course I was servicing sets, and I made $1,000 to $1,200 before graduating. I am doing Radio service work for myself now."

ASHLEY G. ALDRIDGE
1228 Shepherd St., Petersburg, Va.

$10 to $25 a Week in Spare Time

"I am now making from $10 to $25 a week in spare time while still holding my regular job as a machinist. I owe my success to N. R. I."

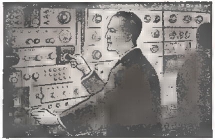
WM. F. RUPP
611 Green Street, Bridgeport, Pa.

"When I finished training I accepted a job as serviceman with a Radio store. In three weeks I was made service manager at more than twice what I earned in the shoe factory."

EMPLOYEES ONLY

"I had an $18 [redacted] week job in a shoe factory. I'd probably be at it today if I hadn't read about the opportunities in Radio and started training at home for them."

"The training National Radio Institute gave me [redacted] [redacted] practical I [redacted] soon ready to make $5 to $10 a week in spare time servicing Radio Sets."



"Eight months later N. R. I. Employment Department sent me to Station KWCR as a Radio operator. Now I am Radio Engineer at Station WSUI. I am also connected with Television Station W9XK."

"N. R. I. Training took me out of [redacted] low-pay shoe factory job and put me into Radio at good pay. Radio is growing fast."

Be a RADIO Technician

Find out How I Train You at Home

RADIO IS A YOUNG, growing field with [redacted] future, offering many good pay spare time and full time job opportunities. And you don't have to give up your present job to become [redacted] [redacted] Technician. I train you right [redacted] home in your spare time.

Why Many Radio Technicians Make $30, $40, $50 [redacted] Week

Radio broadcasting stations employ engineers, operators, technicians. Radio manufacturers employ testers, inspectors, foremen, servicemen in good-pay jobs. Radio jobbers, dealers, employ installation and service men. Many Radio Technicians open their [redacted] Radio sales and repair businesses and make $30, $40, $50 a week. Others hold their regular jobs and make [redacted] [redacted] $10 a week fixing Radios in spare time. Automobile, police, aviation, Commercial Radio; loud-speaker systems, electronic devices are other fields offering opportunities for which N. R. I. gives the required knowledge of Radio. Television promises to open good jobs soon.

Many Make $5, $10 [redacted] Week Extra in Spare Time While Learning

The day you enroll, I start sending you Extra Money Job Sheets which start showing [redacted] how to do Radio repair jobs. Throughout your course I send plans and directions which have helped many make $200 to [redacted] [redacted] year in spare time while learning. I send special Radio equipment to conduct experiments and build circuits. This 50-50 training method makes learning at home interesting, fascinating, practical. I ALSO GIVE YOU A [redacted], PROFESSIONAL ALL-WAVE, ALL-PURPOSE SET SERVICING INSTRUMENT to help you make money fixing Radios while learning and equip you for full time work after you graduate.

Find Out What Radio Offers You

Act Today! [redacted] the coupon for my 64-page book, "Rich Rewards in Radio." It points out Radio's spare time and [redacted] time opportunities and those coming in Television; tells about my course in Radio [redacted] Television; shows many letters from men I have trained, telling what they are doing and earning. Read my money back agreement. MAIL COUPON in an envelope or paste on a penny postcard—NOW!

J. E. SMITH, President
Dept. 9NH, [redacted]nal Radio Institute, Washington, D. C.

J. E. SMITH, President
National Radio Institute
Established 25 Years

He has directed the training of more men for the Radio Industry than anyone else.

RICH REWARDS IN RADIO

MAIL THIS NOW Get 64-Page Book Free

J. E. SMITH, President, Dept. 9NH,
National Radio Institute, Washington, D. C.

Dear Mr. Smith: Send me FREE without obligation, your 64-pa[redacted] book "Rich Rewards in Radio" which points out Radio's opportunities and tells how you train men at home [redacted] be Radio Technicians. (Write Plainly.)

NAME.. AGE.......

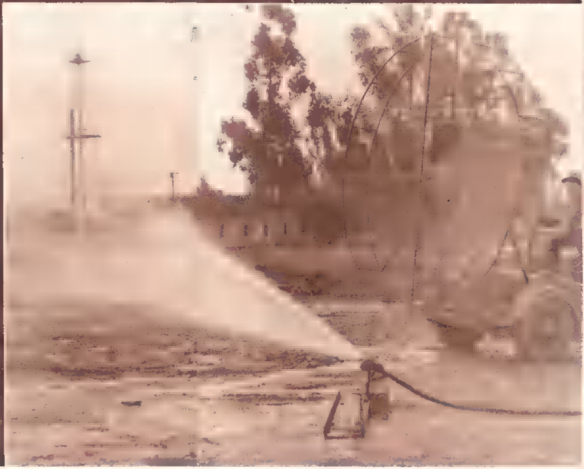
ADDRESS ....

CITY.............................. STATE..............

Fighting the TERROR of the Oil Fields

[illegible] race [illegible] is [illegible] the [illegible]

[illegible]



With the "fogger" in operation, men dare to come right up to the well. Fumes are blown away by the current of air, and fog makes ignition virtually impossible, enabling cappers to [illegible] ahead with their vital work.

Before installing a valve, the men on top of the derrick check to see that all lines are free. Few insurance companies will issue life or accident policies to these "gas roughnecks."

The first point of attack in capping a rampaging gas well is to produce an artificial fog. The "fogger" at the left reduces the danger of sudden [illegible]idation.

The "fogger" in [illegible] With the prop going full blast, a two-inch hose [illegible] a high pressure stream in front of the wind current, resulting in a fog.

AN OIL field basks quietly in the afternoon sun, almost deserted save for a crew drilling a new well—almost down, that well—and a few others who tend the drowsily chugging pump plants. A quiet job, a lonely one, extracting this black gold from the earth.

Suddenly there is a dull thud; scarcely more than would be made by a falling timber. Comes [illegible] ominous hissing . . . a cry . . . the most dreaded cry of the oil fields.

"Gas!"

Out of the new well, men pour like frightened animals. They run for shelter, taking every direction, scattering in the terror of momentary death. All over the field, men seek shelter, while the hissing raises to a wail, a scream.

A terrible, anticipatory minute passes. Another. A man dares leave his shelter. He sprints across an open space, enters a metal building, jerks up a phone.

"Gas!" he calls hoarsely. "Gas, on number 48, at the thousand foot level . . . yes, running wild. Help, quick!"

Ice Fishing Grows in Canada

An airplane calls at a permanent fishing camp [redacted] a northern Canadian lake for a load of fresh caught fish.

CANADA'S wheat growing prairies have entered into competition with her Atlantic and Pacific coast fisheries. They are now sending fish to all parts of the North American continent. The fisheries of the prairie provinces are becoming more important each year. Their output in recent years has averaged more than $4,000,000, and the fishing industry in the prairie provinces is not many years old.

Fish are now taking to the air, or rather are being taken by air to market. Fish caught in lakes in northern Saskatchewan, for instance, are flown twice daily to Prince Albert, [redacted] distance of at least 200 miles, and from there shipped by rail to Chicago, New York and other American and Canadian cities. Each plane carries about 1,600 pounds of fresh caught fish.

In addition to airplanes, tractor trains, consisting of tractors pulling sleighs and a caboose, haul in tons of fresh caught fish in the northern sections of the prairie provinces and northern Ontario. Few horses [redacted] now used to haul fish from fishing camps to rail points, but are used for local transports at some of the fishing camps.

Before the present commercial development of the fisheries of the prairies, fish supplied a constant larder for natives and whites of the northern parts of the Dominion. Indians, trappers, and hardy agriculturists who are making a go of farming in the northern sections of these provinces have all found that the fish from the northern lakes are not only large as compared to the same species caught in lakes farther south, but are also firmer of flesh and tastier. It is a well-known fact among fish men that the colder the water, the better the fish. And many of these inland lakes [redacted] being fished are north of the 53rd parallel of latitude.

The fishermen move to their northern fish camps late each autumn, before the freeze-up stops their travels. They make camp, sometimes requiring log cabins for some of the fishermen bring their families, and get all in readiness for the time when the ice is solid enough to stand the weight of tractors, sleighs and airplanes. Late in December, [redacted] early in January, they start fishing.

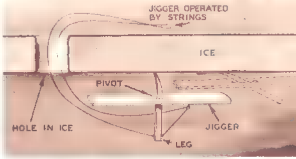
A hole is dug in the ice and a net strung under the ice for a hundred yards to another hole in the ice through which the guide line is hauled up. Eight or ten of the nets are set out on the same line. This is repeated at various places on the lake ice, covering a good

[*Continued on page 126*]

Tractors like this haul sleds loaded with fish from frozen lake fishing grounds to the [redacted] railroad for shipment.

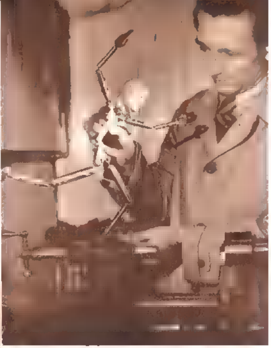
Hauling in a [redacted] of whitefish in northern Saskatchewan, where commercial fishermen dig through ice to net their catch.

Hauling in [redacted] [redacted] [redacted] on a frozen lake in Northern Ontario. Note the snowshoes of the fisherman.



The "jigger" shown above illustrates how nets are placed under water. Pulling the strings [redacted] the ji[redacted] to "walk" under the ice. When it [redacted] gone far enough it is lo[redacted]d by its tapping noise, and a hole is dug and the jigger is removed. The cord attached to it is a continuous line from hole to hole, along which a net can be pulled under the ice.

Actors who never exhibit flashes of temperament are shown as they appear backstage.



Skeletons of the doll actors have movable joints so their positions may be changed for each shot.

This scene from The Seven Ravens shows the angry father cursing his [redacted]

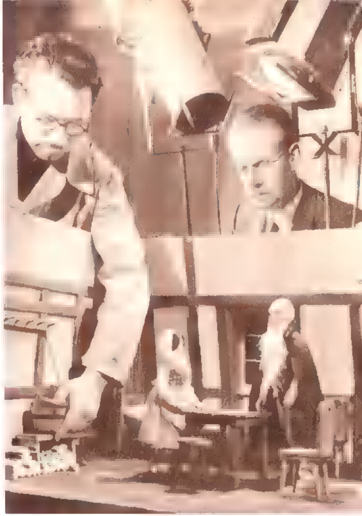
DOLLS Become ACTORS

DOLLS may replace drawings [redacted] actors in animated cartoon movies if the idea developed by three Italian brothers proves successful. The present way of making such films, the best example of which is Walt Disney's Snow White And The Seven Dwarfs, is to shoot thousands of drawings separately and then piece them together so that the subjects appear to move when projected.

To remove the need for a drawing of each movement of a character, the brothers decided to use dolls in miniature settings. Filming procedure is the same but the cost is less. By this method they have taken Jakob Ludwig Karl Grimm's old fairy tale, The Seven Ravens, and turned it into an interesting movie.

In the picture, several scenes of which are shown in accompanying photos, the story tells of an old [redacted] who had seven sons but no daughters. At last [redacted] girl was born, but she was so small and delicate she had to be christened at home. Her brothers were sent for water to baptize their newborn sister, but in their hurry they dropped the jug. Whereupon their father

[*Continued on page* 127]



Man giants, the director and camera man, intrude [redacted] the miniature setting of the Toyland Theatre.

In this scene the little girl learns she is the cause of her brothers turning into ravens.

While seeking her brothers the girl falls asleep in the forest, where a prince finds her.

The princess is tried [redacted] a witch when her own [redacted] suddenly turn into ravens.

The princess had previously taken care of an old blind man and his daughter. They demand her release.

Will Submarines Win The War?

Submarines almost won the World War for Germany. Will the lessons Britain learned then enable her to spike the U-boat terror this time?

A "U-boat" strikes! At left are two destroyers, greyhounds of the the submarine's greatest enemy.

by Cliff Taylor

NIGHT was falling as the British liner *Athenia*, Montreal bound, plowed steadily westward across the North Atlantic. Just nine hours before, Great Britain had declared war on Germany; three hours earlier France had followed England's lead.

At 7:45 p.m. a terrific explosion rent the *Athenia's* side, sending terror into the hearts of the passengers and crew. A waterspout leaped high into the air, to fall back over the decks and lifeboats. Passengers were hurled over the ship rails into the sea. Water surged into the engine and boiler rooms.

Far off across the waters some of the passengers saw the grim outline of a submarine. Its gun, they said, fired a single shot at the mainmast before vanishing into the night. The sea around the mortally wounded *Athenia* filled with lifeboats, swimmers, and wreckage. Around midnight the *Knute Nelson*, a Norwegian freighter, arrived, followed shortly by the yacht, the *Southern Cross*. Early the next

Right: A British warship drops depth-bombs. Below: *H. M. S. Courageous*, British aircraft carrier, which was sunk by a German U-boat with a loss of almost 600

Lighting The Ultra-Modern Home

From the inside looking out—you can [redacted] the callers but they [redacted] only view themselves. Right: Outside the door.

Do you know what can be done with light to make your home [redacted] pleasanter place to live in? [redacted] not read this article and get [redacted] few tips [redacted] how the modern home may be lighted.

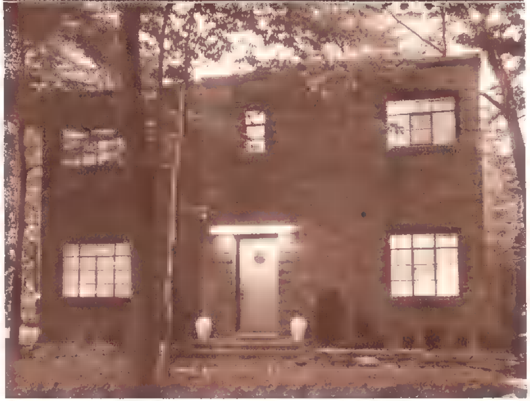
by Walter E. Burton

WHEN an engineer builds a house for himself, you can expect [redacted] few things out of the ordinary; but when the engineer happens to be a lighting specialist, you naturally would look for [redacted] unusual ideas in the harnessing of light. You would not be disappointed in the [redacted] home of G. F. Prideaux, who spends his working hours at the Nela Park laboratories of the General Electric Company, working on applications of miniature lamps. In addition to harnessing light for conventional uses, Prideaux has gone further and done some tricks with heat waves, which are just another form of radiation.

The efficiency of the living room fireplace [redacted] multiplied at least four times by [redacted] polished aluminum reflector placed behind the grate.

When you approach the entrance to his home at 1080 Allston Rd., Cleveland Heights, Ohio, you notice that it is not [redacted] ordinary entrance. Above the door is a box-like canopy made of translucent plastic material in the form of laminated sheets. A 3-watt "night light" burns inside the hollow canopy day and night, but is usually noticeable only after dark, when it produces enough illumination to make the cut-out metal house numerals stand out prominently, to illuminate the steps, and make the keyhole easy to find. When more illumination is desired, three lumiline lamps inside the canopy can be switched on.

As you are about to press the button that sounds the door chime, you notice that the door has [redacted] circular mirror in it, instead of a conventional piece of clear glass. This mirror is convenient for women callers who desire [redacted] last-minute check on their makeup; but for what other reason should an outside door have a mirror facing outward? The answer is obvious once you are inside, for this is not an ordinary mirror but a transparent one. That is, anyone inside the house can look through the mirror and see who is calling, but the caller, who might be a questionable character, can see nothing but his own reflection in the mirror.



The outside of G. F. Prideaux's house [redacted] night, showing the lighted entrance canopy made of translucent plastic material and the corner grouping of the windows for best lighting and ventilation, [redacted] well as beauty.

It is not even necessary for [redacted] occupant of the house to go to the door when a caller rings, thanks to a private "public address" system. Above the doorway, concealed behind the plastic sheets of the canopy, is a loudspeaker-microphone unit that has [redacted] pickup and broadcast range of several feet. Located at convenient points in the house, such as the laundry and master bedroom, are similar units. A central amplifier unit, containing also a speaker and microphone, and resembling a table-top radio, is located in the kitchen. All the messages between points in the system pass through this amplifier, over [redacted] network of wires installed when the house was being built.

There is an attractive fireplace in the living room, but careful inspection reveals something out of the ordinary: Behind the grate is a large sheet of polished aluminum known to the trade as lighting sheet. It covers practically all of the area behind the fire, and is curved outward slightly at the sides. This sheet is one example of how Prideaux has harnessed heat rays, for its purpose is to increase the fireplace efficiency by throwing into the room radiant heat that otherwise would be absorbed by the bricks. Measurements made by him show that the heat output

Dresses Made From Milk

[redacted] passes through a heater into a skimming machine where it is separated from its cream. The skimmed milk then goes into [redacted] curdling boiler to be treated by chemicals which produce coagulation of casein. A press filter next eliminates whey from the casein.

The young lady shown at right is wearing a knitted wool blouse which [redacted] made from 16 quarts of milk. Her bathing suit [redacted] also made from milk.

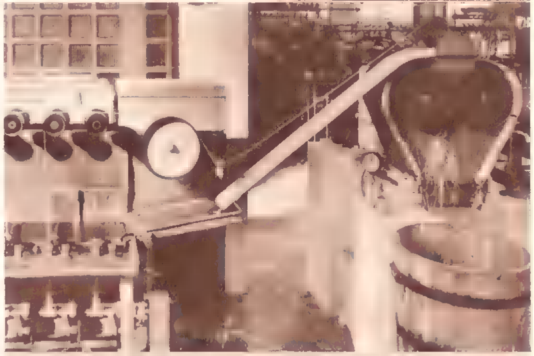
Casein appears in the form shown in the photo at left before [redacted] undergoes a dissolving process with chemical reagents.

AFTER three years of research, tests and experiments the production of artificial wool from cow's milk has gone so far in Italy that the great Snia Viscosa rayon plant at Milan, Italy, is building a huge addition to its factory for the production of the new artificial fibre on [redacted] large scale. Wool is the raw material for which Italy has depended almost entirely on other countries, but when sanctions were

[*Continued on page* 127]

The raw material shown below is finished and ready to be transformed into threads [redacted] skeins for the looms.

The smart fall outfit at right was made from 63 quarts of milk. Artificial wool [redacted] [redacted] shrinkable, water resistant and cheaper than natural wool.



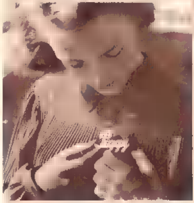
Casein in liquid form is forced through a platinum spinneret containing 600 minute holes. It then passes through [redacted] precipitating bath that solidifies it into filaments.

MAKE THESE ORIGINAL CHRISTMAS GIFTS

by Dale R. Van Horn

Table lamp with solid lead base and wound copper wire shade.

Primitive fruit cart finished in maple or walnut.

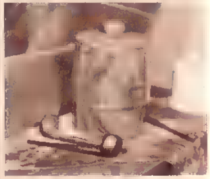


Name pin jigsawed from plywood.

Attractive mirror whatnot (above) [illegible] tie rack with sports motif (below).

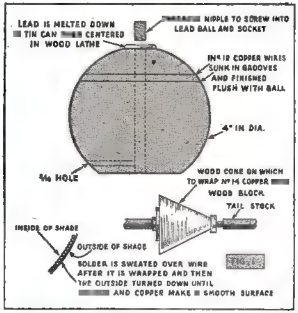
Leather-hinged ciga[illegible] box made to resemble a book.

Lathe turned pipe rack in figured gum [illegible] walnut.

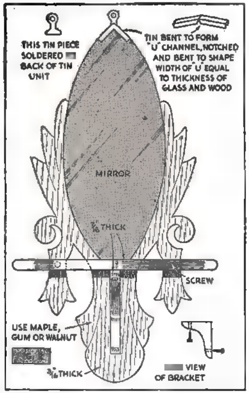


All wood turned humidor that will keep tobacco *really* fresh.

Fill that Christmas [illegible] right in your own workshop.



LEAD IS MELTED DOWN
[illegible] TIN CAN [illegible] CENTERED
IN WOOD LATHE
NIPPLE TO SCREW INTO
LEAD BALL AND SOCKET
Nº 12 COPPER WIRES
SUNK IN GROOVES
AND FINISHED
FLUSH WITH BALL
4" IN DIA.
1/16 HOLE
WOOD CONE ON WHICH
TO WRAP Nº 14 COPPER
WOOD BLOCK
TAIL STOCK
INSIDE OF SHADE
OUTSIDE OF SHADE
SOLDER IS SWEATED OVER WIRE
AFTER IT IS WRAPPED AND THEN
THE OUTSIDE TURNED DOWN UNTIL
AND COPPER MAKE [illegible] SMOOTH SURFACE
FIG. 1



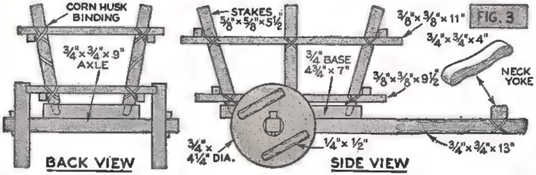
THIS TIN PIECE
SOLDERED
BACK OF TIN
UNIT
TIN BENT TO FORM
"U" CHANNEL, NOTCHED
AND BENT TO SHAPE
WIDTH OF "U" EQUAL
TO THICKNESS OF
GLASS AND WOOD
MIRROR
3/16 THICK
SCREW
USE MAPLE,
GUM OR WALNUT
3/16 THICK
VIEW
OF BRACKET

THERE is no need of expounding the possibilities of the home workshop at Christmas time. That's been done before. Nor need the enterprising craftsman again be reminded that there's a pretty profit in some projects ideal for gift purposes.

Having [illegible] lot of ground to cover in limited space, let's take a look at the group to be described in this article. For Junior there's [illegible] tie rack. Dad's down for a humidor, pipe rack or cigarette book. An all-metal lamp, mirror whatnot and a fruit cart have been selected for mother. There's also [illegible] bracelet, wood initial or name pin. This grouping has been made to give you a choice for each member of the family. Or, if you wax especially industrious, you might make them all. So clear the benches! Let's go.

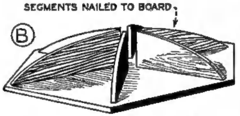
All-Metal Lamp (Fig. 1)

The base is solid lead, the shade a single, long piece of copper wire. It makes an ideal

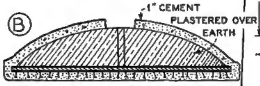


CORN HUSK
BINDING
3/4"×3/4"×9"
AXLE
BACK VIEW
STAKES
5/8"×5/8"×5 1/2"
3/4" BASE
4 3/4"×7"
3/8"×3/8"×11"
FIG. 3
3/4"×3/4"×4"
NECK
YOKE
3/8"×3/8"×9 1/2"
3/4"×
4 1/4" DIA.
1/4"×1/2"
3/4"×3/4"×13"
SIDE VIEW

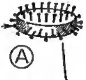
HOW TO MAKE A "STONE" LANTERN FOR YOUR GARDEN


SEGMENTS NAILED TO BOARD
B

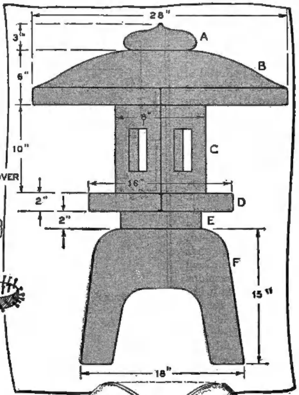
4" X 26" ROOF FORM MADE OF ½" OUTDOOR PLYWOOD

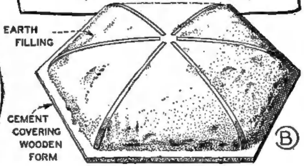

B
1" CEMENT PLASTERED OVER EARTH

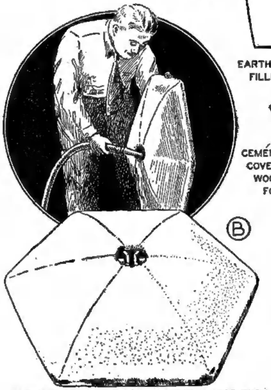
BOTTOM PLASTERED FIRST—THEN FORM IS TURNED RIGHT SIDE UP AND FILLED FLUSH WITH EARTH.



5" WOODEN DISK—STUDDED WITH GALVANIZED NAILS


28"
3"
A
6"
B
6"
10"
C
16"
2"
D
2"
E
F
15"
18"


EARTH FILLING
CEMENT COVERING WOODEN FORM
B

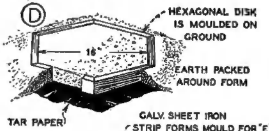


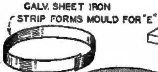
EARTH FILLING IS WASHED OUT WITH HOSE THRU HOLE LEFT IN TOP OF CEMENT ROOF PIECE

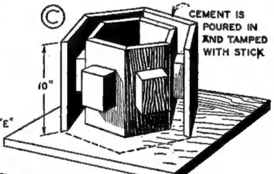
THE massive stone lanterns which add such a picturesque touch to the garden are quite expensive because of the labor involved in sculpturing them from solid rock.

A very substantial copy, however, can be made by plastering cement over wooden forms as shown here. Each section is built separately, making the work easy. The cap "A" is simply a wooden disk studded with galvanized shingle nails and plastered over with a mixture of 1 part portland cement, 4 parts clean, sharp sand and 1½ parts water. It should be fairly stiff to hold its shape in its green condition. For the roof "B" a wooden skeleton is made as shown, the flat bottom plastered over 1-in. thick. As soon as it hardens enough to be turned over, fill the pie-like sections with soil, smoothing them flush with the partitions, and plaster over, as shown, leaving a 4-in. hole in the top through which the dirt is flushed with a hose. If you are a skillful craftsman you may be able to dispense with the wood skeleton and simply make a form of damp soil, making the top first, then when it has set, turn the shell over, fill level with dirt and plaster on the bottom. A hole should be left to wash out the dirt core later. The hexagonal lantern section "C" is poured into a wooden form and tamped down with a

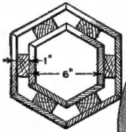
[*Continued on page* 142]


D
HEXAGONAL DISK IS MOULDED ON GROUND
16"
EARTH PACKED AROUND FORM
TAR PAPER

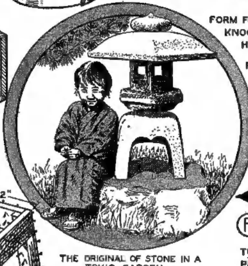

GALV. SHEET IRON STRIP FORMS MOULD FOR "E"


C
CEMENT IS POURED IN AND TAMPED WITH STICK
10"

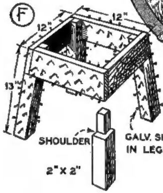
FORM FOR LANTERN SECTION—KNOCKED APART AFTER CEMENT HAS SET.

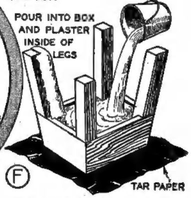

OUTDOOR PLYWOOD
1"
6"

SECTIONAL VIEW OF FORM "C"

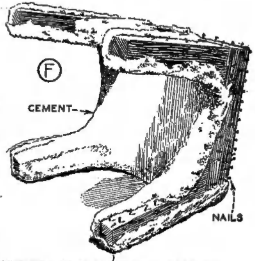


THE ORIGINAL OF STONE IN A TOKIO GARDEN


F
12"
12"
13"
SHOULDER
2" X 2"
GALV. SHINGLE NAILS IN LEGS AND FORM


POUR INTO BOX AND PLASTER INSIDE OF LEGS
F
TAR PAPER

TURN RIGHT SIDE UP AND FINISH PLASTERING AS SOON AS CONDITION OF CEMENT PERMITS.


F
CEMENT
NAILS

FIRST STEP IN MAKING BASE—NAILS ARE DRIVEN PART WAY INTO WOODEN LEGS; UPPER SECTION IS A BOX FILLED WITH CEMENT.

Dart Games For Winter Evenings

A little practice will develop amazing skill in this enjoyable pastime.

Easy-to-make dart games that will provide fun for the family and friends.

by Ray J. Marran

THROWING a steel pointed, feather tipped dart at a target is fun: fascinating fun, which seems to draw the interest of everyone who hefts one of these small missiles and has a target of some sort available at which to throw the dart.

The fascination in dart throwing lies in the skill required to throw the dart, so that it will hit where it was aimed. This skill, as in all games of the tossing and throwing type, must be acquired by practice and by the development of one's own individual technique.

The popularity of dart throwing games is rapidly increasing, due to the fact that games of this type may be made at home, and because they may be played indoors or outdoors by one person alone, or by a group of persons, individually or in teams, as competitive contests.

The fun derived in playing dart games is unlimited, for once started, the fascination of throwing darts rapidly increases and soon becomes a source of diversion that will provide hours of entertainment for any "difficult to entertain" group of house guests. Try dart games on your recreation room guests and see how true this target fascination applies to them. The equipment necessary will consist of six or more darts and a target board installed on a wall or easel, daring the person gazing into its "bull's-eye," to pick up a dart and "hit me if you can."

THE DARTS

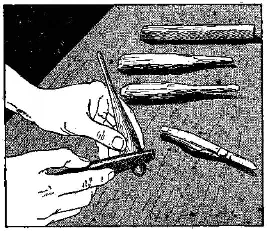
The darts used in the games suggested may be made at home very easily with hand tools alone, or they may be turned on the lathe.

An inexpensive dart, suitable for home use, should be 6 inches long, carved from hard wood, so that the oval forebody is ¾ of an inch in diameter by 3 inches long and tapers to a 3 inch tail stem, on which are glued four 3 inch sections of feathers. The point is good quality steel inserted in the body head, then sharpened to a needle point. The forebody of the dart is weighted with a band of lead.

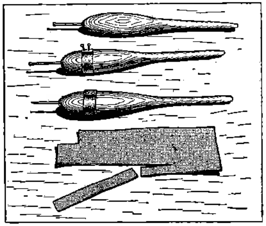
The darts may be lathe turned to the dimensions shown on the sketch, or they may be whittled to shape with a pocket knife.

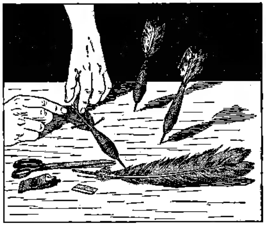
Use straight grained wood for the body. Pine, redwood, cedar, cypress or fir if the body is to be hand whittled. Ash, walnut or maple if the body is to be lathe turned.

The points may be made from 3 inch sections of steel knitting needles, or from a headless 6-penny finishing nail. Insert the points in tight fitting holes drilled in the body head, then sharpen to a needle point with file and sandstone.

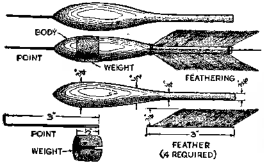


Whittle the bodies of the darts from hard or soft wood then smooth with wood rasp and sandpaper.

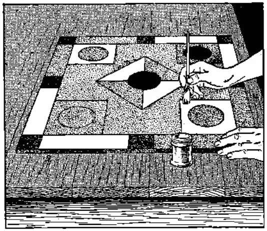




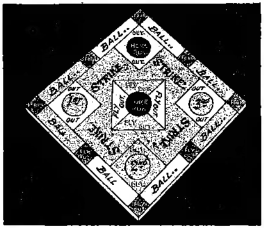
Point dart heads with finishing nails filed to needle points, then tack narrow bands of sheet lead around body for weight. Tails are then feathered with four 3-in. sections of feathers held in place with glue.



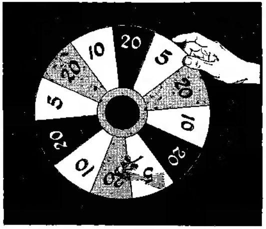
Sketch shows component parts of darts and how they are assembled.

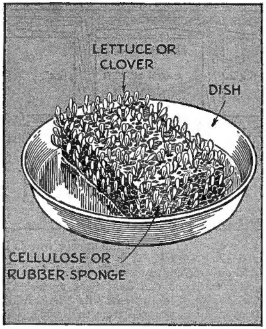


Above is layout for baseball game and below, the finished board.

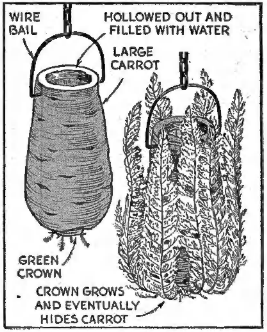


Design for the V section Bull's-eye target (below) is described in the text.

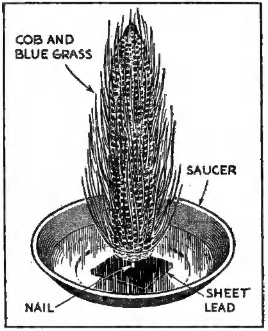




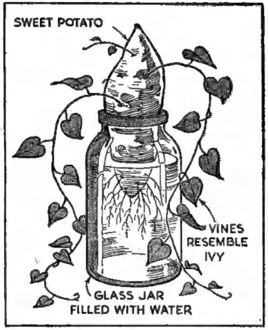
Whoever heard of lettuce growing out of a sponge! But it does.


WIRE BAIL
HOLLOWED OUT AND FILLED WITH WATER
LARGE CARROT
GREEN CROWN
CROWN GROWS AND EVENTUALLY HIDES CARROT

Hanging carrot ferns liven up drab windows.



Not a Christmas tree, but a corn cob planted with blue grass.



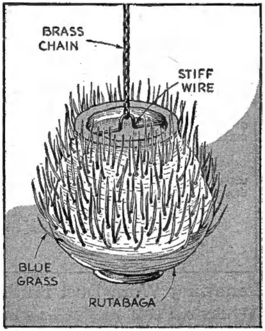
Sweet potato in a jar of water sprouts a handsome vine.

NOVELTY PLANTS FOR INDOORS

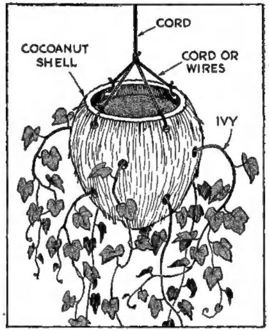
NOVELTY winter plantings will add charm to your home and cause favorable comment from friends. None of them requires much expense, all are easily produced. These trick plantings may be started any time this winter. If you have an indoor flower garden or the sun room well given over to plants, you might give some of these oddities a corner by themselves.

Sponge and Lettuce: Wet a cellulose or rubber sponge and work lettuce or clover seed into some of the pores. Place this in a shallow dish which has a little water in the bottom. Leave it in a warm place for several days until the seeds begin to sprout. Then place it on the window sill or other sunny location, and with plenty water kept in the dish, the seedlings will grow fast! In time they will cover the sponge. You may trim the tips of the plants if you wish, to keep the shape regular.

Hanging Carrot Plant: This is a dandy. Obtain as large a carrot as possible and cut off the root up where it is an inch or more in diameter. Throw the root away. Hollow out the body of the carrot with a sharp knife to make a reservoir. Bend a wire to form a bail and push the bent over ends into the carrot near the top with the crown at the bottom. Keep this well filled with water. To do so you will have to add water every day for it will drink a great deal. For about a week, nothing will happen. Then, all of a sudden, the crown will start to send out shoots which may grow as much as a half inch or more a day. As the growth continues, the shoots begin to curve up all around the carrot and if kept in a warm place, will eventually extend up past the top of the root. Carrot shoots have fine lacy fronds, resembling a fern, and make an ideal hanging plant for beside the window. You can hook a brass chain to the wire bail and hang it wherever desired.



A plant from Mars can be made with Kentucky blue grass and rutabaga.



Cocoanut shells are excellent ivy baskets.

Cob and Bluegrass: After this one gets into full stride you will have what at first glance, appears to be a miniature cedar. Drive a nail through a square of sheet lead, push the nail up into the end of a cob and set the whole arrangement in a dish filled with water. In a few hours the cob is well soaked. Then sprinkle blue grass seed over it thoroughly so that one or more seeds catch in each of the depressions in the cob. Leave it undisturbed and after a week or so the seeds sprout, take root, and grow well. Trimming here too, will help to get the desired effect—in fact you can trim it Christmas tree shape or however you choose. There's plenty of food for the plants in the cob, which will soon be hidden.

Sweet Potato Vines: This is an old favorite but belongs with these others. The sweet potato should be large enough to not quite slip down into the neck of the jar, so that part of the tuber will be exposed as shown. The vines very closely resemble ivy. Quick growing, they will add that much to be desired touch of green to any corner.

Rutabaga and Bluegrass: Hollow out as

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